ILLUSTRATED
ELECTRICAL REVIEW
A Journal of Scientific and Electrical Progress.

VOL. 22. No. 25. WEEKLY. | NEW YORK, SATURDAY, AUGUST 12, 1893. | $3 per Annum. Single Copies, 10 Cents.

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Entered at Post Office, New York, as Mail Matter of the Second Class.

VIEWS, NEWS AND INTERVIEWS.

One species of spiders is said to have a novel way of making love, the sexes communicating by means of strands of web stretching from one retreat to the other—a sort of telephone, so to speak.

The directors of the electric tramways in the Indian city of Madras, have decided to adopt the conduit system instead of overhead wires. A system has been laid before them which, it is claimed, for a slight percentage over the sum required for the overhead method, will providea mode of traction superior to the latter, especially in being less liable to short circuiting. The circuit includes cast iron frames, placed at intervals of four feet. The conductor is pendant from the top of the frame, and by an ingenious arrangement is brought into contact with the grooved trolley, which is in direct communication with the wheel motors. The conductor cannot be tampered with from the outside. Should the conduit require to be opened, the removal of a few inches of street surface permits an iron covering to be lifted in sections of four feet. Square iron gratings at eight-feet intervals permit of the insulators being easily reached by the hand at any time. The conduit is made large enough to allow of lighting and additional power cables being placed within it.

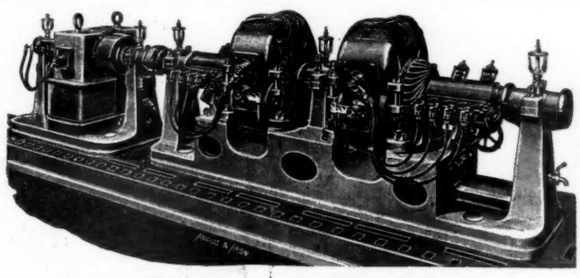
The suggestion to copper-plate iron and steel ships by the electrolytic method is being talked about to some small extent in the United States, an inventor having asserted that he has discovered a new plating solution which deposits copper "in a much finer and more dense state," than that deposited from the ordinary sulphate solution. The suggestion has been made before, and if it could be carried out successfully would be economical, as it is now necessary to sheath the iron or steel ships with wood and fasten copper plates on that, or use one of the many preparations which are supposed to keep the vessel's hull clear of barnacles, etc. There is not much difficulty in coating iron or steel with copper, but it may be doubted whether it would pay in the case of ships.

Rev. William E. Needham, pastor of the Trinity Baptist Church, of Camden, N. J., last week preached two different sermons, from two different texts, to two different congregations at the same time and located no less than 30 miles apart. This sounds strange and mysterious, and smacks not a little of the ghost world. But there is nothing supernatural nor mysterious about it. On the contrary, there is a very sensible and plausible explanation, and the incident is simply a unique experiment with Edison's phonograph. Pastor Needham was in Camden in the flesh, but his spirit, or rather his captive voice, was in Coatesville, Pa.

The Sayers Feeder Compensator.

The illustration herewith, which is from *Industries and Iron*, shows a compensator for fall of pressure in feeders, constructed on Sayers' new principle, for the Midland Railway Company's electric lighting station at Derby, England. The compensators are the joint design of Mr. W. B. Sayers, of Glasgow, and Mr. J. Sayers, of Derby, and maintain the pressure constant at the different ends of the feeders in a low pressure three-wire system. They will be placed in the engine room, and the circuit to the feeders which they control will be led through them. They will then raise the pressure automatically just enough to compensate for the drop in the feeders with whatever current there may be. This arrangement dispenses with hand regulators and also with pilot wires.

The compensators themselves consist of a pair of low tension series dynamos mounted on one shaft, and driven direct by a motor at a constant speed. The circuit of the extreme positive feeder traverses one of the armatures of the compensators, and that to the extreme negative feeders traverses the other armature. The current of each feeder thus produces a field proportional to itself through the armature and keepers, which form magnetic circuits. The magnetic field reacts on the winding of the armature, causing an addition of pressure also proportional to the current. Adjustments are made so that the amount of the added pressure exactly compensates for the drop in the feeders. The principle of Mr. Sayers' reversing connections has already been described in this journal.



THE SAYERS FEED COMPENSATOR.

In order to compensate for the drop of pressure in the third or center wire, when there is a current in it, the circuit is led round the respective keepers in such a manner as to compensate exactly for the disturbance which is caused by the drop when there is a balancing current owing to the two sides being unequally loaded. This is, no doubt, carried out on the same principle as in the compound dynamos for three-wire systems, described by Hopkinson, in 1882.

Two sets of compensators have been constructed for the Derby station, one to carry a maximum current of 500 amperes, and to raise the pressure in the proportion of the volt for every 95 amperes, the other to carry a current of 400 amperes, and to raise the pressure in the proportion of the volt for every 55 amperes.

In each case the third wire arrangement is adopted for the two outer conductors of the three-wire system, each having a sectional area twice that of the central conductors.

Electricity the New Remedy for Constipation.

We learn from *La Lumière Electrique* that Dr. Boisseau, of Rorker, has invented a new electrical treatment for stomach troubles. The mode of operation is as follows:

After a thorough cleansing of the contents of the stomach by any of the well-known devices, the patient is requested to sit on an insulated chair, which is connected to one pole of an influence machine, the other pole of which is grounded. The physician now introduces the probe or electrode (consisting of a rubber tube enclosing a copper wire, with a ball-shaped terminal) into the patient's stomach, and orders him to hold the other terminal of the probe in his hand.

It will be seen that the probe and chair represent the two coatings or armatures of a condenser, whose dielectric consists of the tissues forming the walls of the stomach. It is reported that this treatment produces remarkably good results.

Among other advantages, the inventor of this new electrical cure states that impaired digestion is relieved after one treatment, and that in cases of inveterate constipation complete cure was effected after the third or fourth trial.

The Latest Edison Lamp Suits.

It was expected that the suits of the Edison Electric Illuminating Company, of New York, against the Mount Morris Electric Light Company and the United Electric Light and Power Company would be decided on Wednesday of last week. By mutual consent Judge Lacombe ordered a postponement of one month, with no injunction in the meantime.

THE PATENT OFFICE MUDDLE.

Ninety-one thousand two hundred and ninety-eight dollars and thirteen cents in twenty-five days! This is the sum of hard-earned dollars paid into the United States Patent Office by the inventors of the country during the month of July just ended. Against this income the office disbursed during the same period for salaries and other current expenses, including the printing of patents and the publication of the *Official Gazette*, about $70,000. The balance has followed the enormous surplus of $4,179,910.26 (on January 1, 1893), which the Treasury Department has received from the Patent Office and paid out to provide for extravagances and meet deficits of other bureaus of the governmental establishment.

In the face of this long-continued impartiality (some call it injustice), the people interested in patents have usually made no general complaint. They have, however, always insisted upon getting what they are compelled to pay so high a price for. A few of the things they expect, and claim as their right, are fair facilities for obtaining public information relating to the operations of the bureau; reasonably prompt action upon their applications and prompt issuance of their patents when allowed, and a good quality of work in the reproduction of their line drawings, which the office never accepts if the slightest sign of inferior workmanship can be discovered.

Up to the close of the last fiscal year no particular difficulty had been experienced in securing these advantages, so far as the facilities of the department rendered it possible to meet the demands made upon it. Since that time the business of the office has been thrown into a muddle, which has caused great embarrassment and led to general complaint, not merely from young and ambitious inventors anxious to read their names on documents bearing the government's seal, but from representatives of many of the largest and most responsible manufacturing, commercial and financial interests in the country. A few of these complaints reach the Patent Office; many of them crop out in other quarters. The difficulties complained of seem to result from confusion and delay in the operations of nearly every division in the office.

The work of the examining divisions is delayed for want of the records of patents recently issued. In the ordinary routine of the office, when an examiner passes a case and sends it to the Issue Division, he gets the photo-lithographic copies of drawings back within three weeks, and his file of the

official *Gazette* is kept up to date. Now the drawings are six weeks behind and only one number of the weekly *Gazette* has been issued since July 1, that number having been 24 days behind time, and of an inferior style of execution that reflects credit on nobody. Many of the illustrated drawings are so indistinct and imperfect that it is impossible to read them even with the specifications to aid in their explanation. Much chagrin and mortification is expressed that the government should be compelled to send such an important document, so poorly printed, to foreign governments and to the principal libraries of the world. Much exasperation is felt by persons who have sent copyists with powers of attorney to the office and requested permission to make copies of documents, urgently needed in important lawsuits, and who have received neither permission to make the copies nor assurance that the office would furnish them at any stated time. The patent models, usually kept in orderly arrangement for convenient examination and study, have been thrown into junkshop piles, in process of transportation to new quarters in a private building, and for a long time to come will be inaccessible. This was done for the purpose of making room in the Patent Office for 100 Land Office clerks, who desire to be near the head of the department. Several prominent and experienced officers of the bureau have been required to vacate their positions, and it is anticipated that many more will shortly have leave to engage in private pursuits.

The most sweeping change was made in the method of photo-lithographing the patent drawings. This work was suddenly taken away from a company which had a most perfectly equipped establishment and every facility for doing it, and given to a newly organized company which had neither facilities, skill nor preparation of any kind. The gravity of this mistake is painfully obvious. It would be quite as consistent for the government to stop the transportation of the mails over its most important route by an existing railroad, and make a contract for carrying them with a company which would be obliged to build its railroad before it could commence the service. The difference in the bids of the two companies was less than $2,000, while the changes made in the Interior Department bureaus will add $8,000 to its annual expense for rent of private buildings. There are some shady corners in these transactions which will be severely criticised when the light is turned into them. Politics is at the bottom of these disastrous changes. In every administration some department seems to suffer a calamity. In Cleveland's first term it was Garland and Pan Electricity; Harrison's administration had to endure Wanamaker and "ten cent telegrams;" now the Department of the Interior is experiencing the peculiar methods of Secretary Smith, and it is not all surprising that these methods are inimical to the interests of the patent system.

With the head of the department from Georgia, the assistant secretary from Mississippi and the appointment clerk from North Carolina, a section of the country in which only one person in every 20,607 ever invents anything worth patenting, it would be unreasonable to expect much respect for the cranks of Connecticut, where one person in every 955 is an inventor. Commissioner Seymour fully understands and appreciates the value of the patent system, and has been most zealous in his endeavors to promote its interests, but it is quite evident that his superiors regard the collection of models as a sort of dime museum; a patent as a license to the rich to cheat the poor, and the patent office as an asylum for impecunious politicians. It is a significant circumstance that a room in the building vacated to give the crowded electrical division a little more room was immediately taken possession of by the Secretary's appointment clerk. Some questions growing out of the Patent Office muddle are likely to be appealed to President Cleveland; an investigation of Congress at the opportune extra session is promised, and interesting developments are looked for. G. C. M.

Washington, D. C., August 3.

The Jury of Awards Formulate a Few Tests for Direct Coupled and Other Dynamos.

The jury appointed in the electricity class of the World's Fair have begun to formulate rules to guide them and simplify matters in the awarding of the medals.

It is proposed to test a number of the larger direct coupled dynamos for the purpose of ascertaining the consumption of steam and the electrical and commercial efficiencies of the apparatus under various loads. Tests of smaller apparatus of this kind may be decided upon later, but arrangements for the same are not yet completed.

Tests will be made for the purpose of helping the jury to form an estimate of the value of the exhibits. Where the jury are able to come to a conclusion without carrying out such tests they may grant awards based on an examination of the exhibits. It will only be practicable, in relation to the particular exhibits referred to herein, to test such representative apparatus as is located favorably in relation to steam supply, and can be operated under a desirable load. It is, therefore, to be understood that the awards on the apparatus for which tests are herein provided are to be "granted upon specific points of excellence of advancement," the same as other exhibits, but that an abstract of the general results of the tests will be added to the report for an award, with references to the detailed reports on the subject.

There are to be three classes of tests of each apparatus, to be designated A, B and C. They are:

"A" tests: Not less than one or more than three complete tests are to be made with each apparatus to ascertain the economy in the use of steam and the relation of the indicated horse-power to the electrical output. One of such tests to be made with a load corresponding substantially with the maximum efficiency, one near the minimum allowable load, and one near the maximum allowable load.

"B" tests: Partial tests, supplementary to the above, without measuring the water evaporated, but varying the load by gradual increments through the practicable range, to be made for comparing the indicated horse-power with the electrical output.

"C" tests: These tests are designed to aid in distributing the energy developed in the engine in excess of that shown by the total output in watts, to include friction tests of engine and a determination of the resistance caused by exciting the field with the main circuit open; they include also tests of electrical resistance, heating of armature, field, etc.

The order of tests provides that the apparatus shall be first operated at six-tenths of its maximum load for at least four hours before commencing the tests. The first complete or "A" test is then to be made, to be followed by the minimum "A" test, and that followed by the maximum "A" test. In case all of these tests cannot be made in succession, the rule as to operating the dynamo four hours at six-tenths load is to be followed previous to each test. The same preliminary run to be made also before commencing the "B" tests.

TELEPHONE CHAT.

A telephone system is what Greenville, Ala., is now working for.

The Bell Telephone Company, in Ottawa, Can., intend laying a further extension of their underground wire system in a few days.

The Troy, N. Y., Telephone Company has purchased the lines running to Eagle Mills, Poestenkill and Sandlake, and is putting them in first-class shape. They were formerly operated by the Albany company.

At a meeting of the directors of the New England Telephone and Telegraph Company, held on Wednesday, July 26, a dividend of 75 cents per share was declared, payable on Tuesday, August 15, 1893, to stockholders of record at the close of business on Monday, July 31, 1893. The transfer book will be closed from August 1 to August 15, 1893, both days included.

The modern marvels of electricity have not been appreciated by the Indians of the country, who have done their best to stop their importation. A telephone line had been laid down by the Government between La Paz, Bolivia and Lake Titicaca, 45 miles away, but the Indians got the idea that the much-sounding talk of the white man that could be heard thus far would disturb the long sleep of their ancestors, and they stole the wire and used the poles as firewood. These were replaced, but at last the whole line was ruthlessly torn down, and the Government was compelled to abandon it.

The Indians next turned their attention to the electric light plant, which was being installed here, and awaited an opportunity of destroying it. After the plant had been in operation a few nights there was an eclipse of the moon. The Indians believed that the electric light was absorbing or swallowing the moon, and, gathering in a body, moved upon the plant to destroy it. It was saved only by the intervention of a large body of troops.

The Government next day selected several representative Indians, took them to the power house and shocked them severely, then took them out along the line and shocked them again with the wires. After this they informed them that the electric light was an evil spirit, and that they had better leave it alone. The Indians were convinced that they could not fight against an enemy that could twist their muscles into kinks when miles away, and there has been no further trouble.

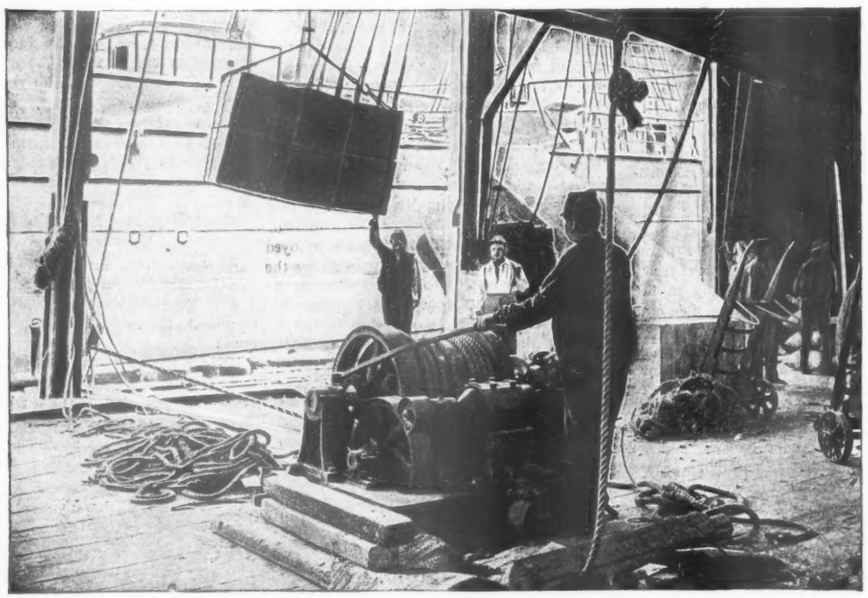
An Electric Dock Hoist Installation.

An interesting example of an advantageous substitution of electrical power for that of steam is afforded in the installation of electrical motor hoists, which have been in operation during the past two years and a half on the wharves of Sanderson & Sons, in Brooklyn, where the Wilson transatlantic steamers discharge.

The installation made by Messrs. Curtis & Dean comprises nine 10 horse-power General Electric hoists, of the drum and winch head type, in continual use, loading and unloading the vessels which are constantly arriving and departing. The driving motors are of the well known bi-polar type.

When the hoists were first installed, opinions were freely expressed that they could not possibly do the work as cleanly nor as rapidly as the donkey engine, and that they would soon get out of order, prove costly of repair, and give way to the triumphant returning steam hoist. The workmen especially viewed the innovation with disapproval.

The hoists have been in operation for two and a half years and the trend of opinion is now diametrically opposite. The owners would not be without them, and the men are so convinced of their many superio features that any proposal to return to steam hoists would arouse an active protest, if not cause actual strike. The hoists have so completely accomplished every duty they have been called upon to perform, that the installing company has yet to hear the first complaint against them. They are readily moved from place to place on the wharfs or upon the vessels themselves, wherever they may be needed, require little or no attention, and are made ready for service by the mere connection of the conductors to the service wires.



General Elkctric Company's Electric Dock Hoist.

Perhaps the most important feature emphasizing the superiority of these electric hoists over their predecessor, the steam hoisting engine, is that of repairs. During the two and a half years in which these hoists have been under continual daily duty the total cost of repairs has amounted to the phenomenal sum of $24.75, or $2.75 average for each hoist. It may be doubted whether any such fact as this has ever been recorded about a steam hoist.

Especially on board of the many transatlantic steamers, where the lighting is done by electricity, are these electric hoists advantageous; and it is expected that it will be but a short time before they will be generally adopted, now that their value is recognized.

This installation is by no means exceptional. Electric hoists are superseding the steam hoist, not only in marine and wharf work, but in factories, mines, engine shops and other places, where economy, rapidity of work and perfect operation is requisite.

The Otis Electric Elevator and Electric Pump.

That the Otis electric elevator is coming into great popularity is well attested by the fact that Otis Brothers & Company, 38 Park Row, New York, are building a large addition to their factory at Yonkers, N. Y., to cost about a quarter of a million dollars. This addition will be devoted exclusively to the manufacture of electric elevators, which now forms about half the business of Otis Brothers & Company. Mr. C. H. Kloman, of the New York office of the company, has just sold four Otis electric elevators to the Metropolitan Opera House, of this city.

The latest type Otis electric elevator is shown in Fig. 1. The winding machinery and safety appliances (including the safety governor, the gravity wedge safety, the automatic stop-motion and the slack-cable stop; also the devices for controlling the movement of the elevator car) are such as this company have been constantly building for the past 25 years; consequently, there are no experimental features. To give motion to the elevator machinery, the very ingeniously constructed motor (invented by Mr. Rudolf Eickemeyer, of Yonkers, N. Y.), which possesses many novel and meritorious features, especially adapted to elevator service, for which it was expressly designed, is utilized. This motor, when so combined with the elevator, stops and starts with a gradual movement, and consumes power only in proportion to its load, and only while the elevator is in use, thus effecting the greatest economy in the consumption of power. It possesses in the highest degree the best points of motor construction and extremely high efficiency. Simple and accessible in all its parts, of the best material to meet electrical and mechanical requirements, it is also protected by its unique construction, which makes the motor completely iron-clad, without adding any unnecessary weight. It has, further, the special advantage of a powerful field and the shortest possible magnetic circuit, which entirely prevents sparking at the commutator and affords perfect self-regulation. It may also be added that, although it possesses a very strong magnetic field, yet there is no external magnetism in the machine, and consequently there is no danger of damaging a good watch, even if placed in contact with the casing. The motor is so coupled to the elevator gear that it starts and stops with the winding machinery, the whole being under perfect control of the operator in the car, thus operator in the car the exact position of the controlling and reversing switch on the motor.

After several years of careful study and practical experiment, and having had a large number of these machines in actual service, Otis Brothers & Company are prepared to offer to elevator users the first electric elevators that they have found to be successful in meeting the important requirements of easy and gradual starting and stopping of the car, concurrent action of motor and winding machinery and utmost economy of operation.

In Fig. 2 is shown one of the types of electric pumps made by Otis Brothers & Company. This pump is especially adapted forming a self-contained apparatus, free from jerky and irregular running of detached gearing, as when operated by belts.

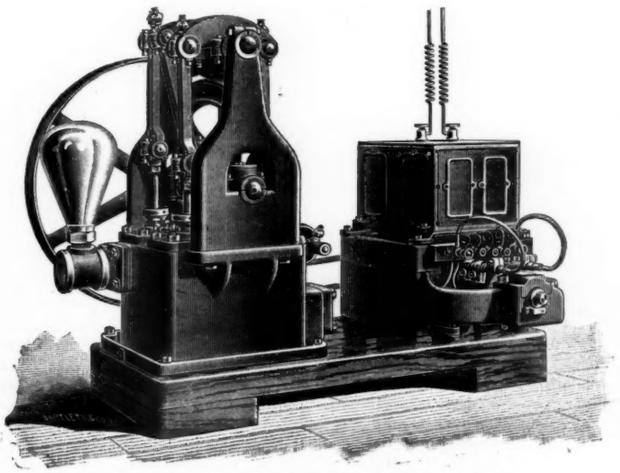


FIG. 2.—OTIS BROTHERS & COMPANY'S ELECTRIC PUMP.

The difficulties heretofore experienced from heating and "burning out" have been effectually guarded against in the construction of this machine; and in connection with the operating device, there is employed an indicator which at all times shows the entire freedom from the shock—jar—or water-hammer—usual in other styles of pumps; another is the economy in power naturally resulting from the constant motion of the column of water—as it does not require as much power to keep a body in constant motion as it does to move it with an alternate starting and stopping motion—as is the case with other pumps.

to furnishing water for domestic purposes, irrigation, fire protection, farm service, and for operating elevators.

The water is moved with a continuous and unvarying flow, entering at the suction, and passing through valved pistons, thence out at the discharge.

The advantages of this principle of action are many, prominent among which is its

Another advantage arising as a natural result of the continuous action is the even distribution of the work at all points of the revolution of the pump, thereby creating a uniform resistance to the action of the electric motor. This is absolutely necessary to insure durability, as an intermittent or variable resistance to the motor would soon cause the total destruction of the armature winding, and necessitate expensive repairs.

To be brief, the continuous acting principle, upon which all of the Otis electric pumps are constructed, avoids all of that harsh, noisy and unsteady operation so common in pumping machinery in general.

Concentric Cable Phenomena in Alternate Current Working.

This paper, published in the *Elektrotechnische Zeitschrift*, contains a discussion of the reasons for a phenomenon observed by the author in a large high-pressure network comprising about 53 miles of cable, which was that when a section of cable was switched in or out while running, or if a fuse blew, the insulation was frequently punctured. This puncture occurred even with cables of the very best insulation possible, but only when the inner conductor was coupled on first, as in making a joint, or conversely if the outer conductor were first broken, and if the section in question had very lightly loaded transformers on it. The explanation is founded by means of formulæ and diagrams, which must be consulted by anyone interested in the subject, but which give following numerical example: Suppose a frequency of 43 ∞, an alternator at 2,000 volts, a cable network of 50 miles, to which is coupled a section of about a mile, containing transformers of 20 kilowatts aggregate output, having no secondary load: then the voltage between the two conductors will rise to 5,300, and that between the outer layer and earth (or sheathing) to about 5,400 volts. And if the curve given by the alternator be very different from a sine curve, the volts may rise still more, and a further increase takes place on account of the saturation of the cores of the transformers by the large current.

The author concludes that an arrangement of switching should be adopted which should render it impossible to have the inner conductor on alone.

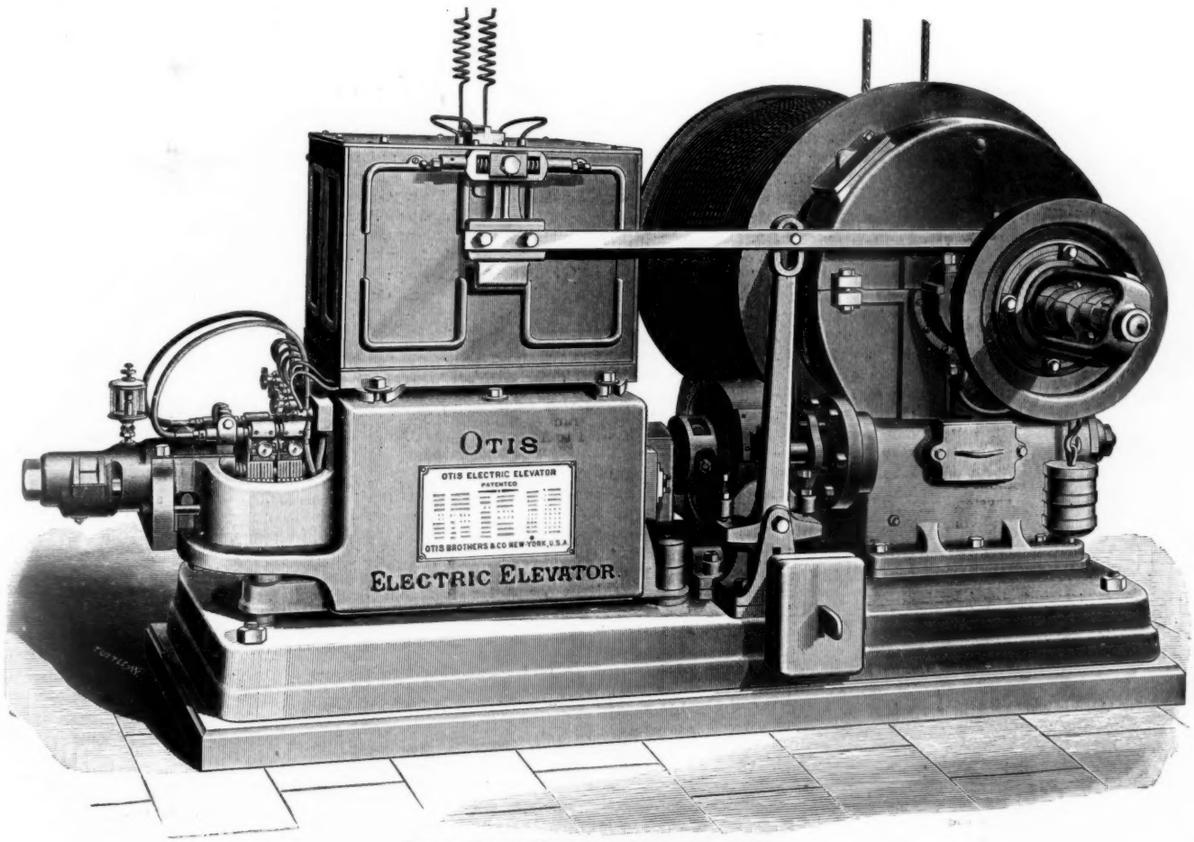


FIG. 1.—LATEST TYPE OTIS ELECTRIC ELEVATOR.

Electric Traction Interests Win in England.

[FROM OUR EUROPEAN CORRESPONDENT.]

As was predicted in a previous issue of the ELECTRICAL REVIEW, the report of the Joint Committee of the Houses of Lords and Commons on Electric Powers (protective clauses), issued on Monday, July 17, is unanimously in favor of electric traction. It was, in fact, practically impossible for any other conclusion to be drawn from the evidence; and although the report is not very long, it will only be necessary to summarize the principal features of it. The committee have agreed that in all bills and provisional orders authorizing the use of electricity as the motive power, a clause shall be inserted compelling the tramways or "undertakers" to employ insulated returns or uninsulated metallic returns of low resistance. The undertakers shall take all reasonable precautions in constructing, placing and maintaining their electrical lines and circuits and other works, and in working them, so as not to injuriously affect, by fusion or electrolytic action, any gas or water or other metallic pipes or structures. It will be evident that this means that electric tramways may use uninsulated rails as the return part of the circuit, and that they must assist the return by the use of an auxiliary conductor connected to the rails. The committee also state that the undertakers must minimize, as far as is reasonably practicable, any injurious interference with the electric wires and apparatus belonging to other parties and the currents therein, whether the latter use, or do not use, the earth as return. It is likewise stipulated that the undertakers shall take all reasonable precautions so as not to injuriously interfere with the working of any wire or apparatus used for transmitting power, or of telegraphic, telephonic or electric signalling communication, or in the currents in such wires or apparatus.

The committee have agreed as recommendations, (1) That in the present state of electrical science, it is not to the interest of the public to insist upon electric tramways using an insulated return, and that the enforcement of the use of an insulated return would retard the development of electric traction. (2) That the best known means of overcoming the interference by leakage and induction with telephones is to provide an insulated return for the telephones, and particularly as the evidence showed that telephone construction was already tending in that direction, and that better results are secured to the public by the use of a twisted metallic circuit insulated entirely from the earth. (3) That the danger of interference by leakage and induction with railway signals may be remedied at comparatively small expense by the adoption of an insulated metallic return by the railway companies. (4) That although electric tramway and railway companies should be allowed to use the wheels of carriages and the rails to complete the electric circuit, the currents should be produced and used so as to mitigate, as far as practicable, any injurious effect in telephonic communication. (5) That it was desirable to facilitate the use of completely insulated metallic circuits for telephones, and for that purpose statutory powers should be granted to telephone "undertakers," enabling them to lay their wires underground. (6) That the danger from fusion or electrolytic action appeared to have arisen from a faulty system of constructing electric tramways, and that such danger can be reduced by improved methods of construction so as to be practically negligible.

The committee therefore recommend that the Board of Trade shall make regulations to secure the best system of working electric tramways and railways; the regulations to provide: (*a*) That a return conductor, if in contact with the ground, shall be of such section and resistance as to have no difference of potential sufficient to set up injurious leakage currents in the earth. (*b*) That such electrical tests shall be applied to the lines by the undertakers as the Board of Trade may consider necessary. (*c*) That the committee regards with apprehension a large extension of the system of overhead wires in crowded centers. The committee finally conclude that it appears to them just that tramways proposing to use large currents should be required to give ample notice to those using small currents to enable the latter to protect themselves by insulation, and that a period of two years may fairly be allowed to telephone and telegraph companies from the date of the granting of powers to use electric traction.

The above recommendations, which will, without any doubt, be adopted, are so clear and concise as to scarcely require any comment. Summarized in a few words, they mean that electric tramways must use an additional uninsulated rail or conductor to assist the return of the current, that the telephone and railway companies must introduce metallic returns for their wires, and that the tramways must take all reasonable precautions to prevent any interference with those wires, and with gas and water pipes by leakage or induction. The only objectional feature of the report is the two years' notice to telephone and telegraph companies; one year should have been quite sufficient. Nevertheless, the whole report is in favor of electric traction, and with the adoption of the recommendations, a period should soon commence of a remarkable development of electricity on tramways in the United Kingdom.

Electricity Made Perfectly Plain.

An old man from somewhere among the suburbs stood on a Forty-seventh street corner watching a trolley car moving swiftly eastward with a heavy load of passengers.

"That's some of these 'lectric cars, ain't it?" he said, turning to a bored-looking man who was leaning against a telegraph pole.

"Yes."

"I don't see how 'lectricity can make a car full o' people flip along over the ground like that."

"You don't?" exclaimed the other, becoming interested. "Why, it's easy enough to see through when you once understand it."

"I 'xpect so; but I've never heard enough about it to understand it."

"It is all a matter of watts. A watt, don't you see, is a fraction of a horse-power expressed in the technical language of electrical engineering. You know what an ampere is, don't you?"

"A what?"

"An ampere. It is a quantity of electricity that goes through the wire and develops the watt. The electricity comes from the central dynamo through that wire you see running along overhead, runs down through that iron pole and goes to the motor, which is an ingenious but perfectly simple arrangement of wire coils with a revolving frame, acted upon by the current which sets it to spinning, and thus puts in motion a small cogwheel that engages another cogwheel that communicates the rotary movement to a third cogwheel fastened to the axle of the car. It is as plain as day when you get the idea."

"Yes, but how"——

"Don't you understand it yet? There's a sort of wire brush that presses against a copper plate connected with the motor, and the wire is wound on the frame I was telling you about, so that when the current enters the motor it can go either way, and part of it goes one way and part the other, so that the pressure is applied in opposite directions, and that's what makes the jigger revolve and sets the wheels in motion. The current goes back through an underground wire. See through it now?"

"Y-yes. I think I kind o' get the idee."

The affable stranger strolled down the street, and the old man took another look at the overhead wire, gazed earnestly in the direction in which the car had gone, took off his hat and wiped his forehead.

"What I'd like to know," he muttered, "is how in thunder the electricity makes the car go."—*Philadelphia Inquirer.*

Long Distance Transmission at Middletown, N. Y.

Articles of incorporation of the Middletown, New York, Pipe Line and Power Company have been filed with the Secretary of State for the formation of a stock company for the development of the water power of the Neversink river. The object is to supply cheap electric current.

The Neversink river is one of Sullivan County's swift running mountain streams. At a point known as Eden Falls, an additional fall of 220 feet can be obtained. Here the company has purchased 12,000 acres of land, including about two miles of river front.

One or more dams will be constructed. The water will be conveyed in lines of steel pipe to the power house, where dynamos will be placed for conveying the current to the city of Middletown and villages along the route. The distance is about 15 miles. It is estimated that 7,000 horse-power can be obtained during all the year, but in case a larger supply of water is found necessary during the summer months it can be drawn from any of the numerous lakes which abound in the immediate vicinity. Several of the lakes are already tapped, and when drawn on, which is seldom, flow into the river at the point, and thence to replenish the Delaware and Hudson canal. The company intend to furnish current 24 hours per day, and make a specialty of supplying it for power and heating.

Middletown is one of the most progressive cities in the State, and her go-ahead business men are to be congratulated for seeing the great advantage of utilizing water power for electrical purposes.

The names of the incorporators are W. D. Stratton, Horace W. Corey, E. A. Brown, Leander Brink, Chas. H. Brink, Chester Belding, J. B. Hulett, I. C. Jordan, George S. Belding, Robert O. Lewis, H. S. Pound and George Smith, of Middletown; E. M. Willis, New York, and Eber L. Brown, of Unionville, N. Y. The capital stock of the company is $50,000, all of which has been subscribed and one-half paid in. Work is to be started at once.

Reasons for Suits Against the Mount Morris and United Companies.

In regard to the suits commenced on July 27 by the Edison Electric Illuminating Company, of New York, against the Mount Morris Electric Light Company and the United Electric Light and Power Company, the following statement was made on July 28 at the office of Eaton & Lewis, counsel for the Edison Company:

"The Mount Morris Company and the United Company were organized and went into the business of supplying incandescent lights from central stations subsequent to 1885, the year when the original test suit on the Edison patent was begun.

"The test suit having resulted last October in a decree of the United States Circuit Court of Appeals affirming the validity of the patent, suits were recently brought by the Edison Illuminating Company, which owns the Edison patent for the city of New York, against the Holland House and Imperial Hotel as users of infringing lamps in connection with electric plants on their premises, and injunctions obtained restraining them from using such lamps and requiring them to provide themselves with other means of illumination within 30 days. This time will expire on the 30th instant.

"The suits brought yesterday are the first suits yet brought on the patent in question against competing central station companies.

"Injunctions and accountings of profits are asked for, and the hearing will be had before Judge Lacombe on next Wednesday."

New Electric Plant for Dannemora Prison.

Inspired by the bungling execution of Murderer Taylor, at Auburn, Warden Thayer, of Dannemora Prison was last week directed to put in an entirely new electric plant in his prison. The prison will be lighted by electricity, and the dynamo held in readiness should the regular apparatus fail to kill. This is done because of the far-removed position of the prison from any city. Warden Thayer said he hoped to have the new plant ready before the killing of Murderer Foy during the week beginning August 27.

ELECTRIC LIGHT FLASHES.

An application was made to Justice Ward in the Supreme Court of Buffalo, N. Y., last week, for the appointment of a receiver for the Brush Electric Light and Power Company, of Niagara. The judge will announce his decision later.

A syndicate of Middletown, N. Y., capitalists have organized a company to utilize the water power of the Neversink river—13 miles distant—to generate electricity, which will be transferred for purposes of lighting and power. A fall of over 200 feet and abundance of water can be obtained.

The city council of Rochelle, Ill., last week passed an ordinance appropriating $10,000 for the purpose of constructing, erecting and operating an electric light plant; the city to issue one hundred $100 bonds, payable in one, two, three, four, five and six years, bearing six per cent. interest.

The Shaw Electric Crane Works, of Muskegon, Mich., has been running full blast since July 5. Last week the company received an order for a 12-ton traveling crane from the Stillwell-Bierce & Smith-Vail Company, of Dayton, O. The crane works has orders for delivery as far ahead as November.

The Rockville, Conn., *Journal* recently issued a very creditable special edition entitled, "Illustrated Rockville." Among the prominent industries of the town illustrated and described was the plant of the Rockville Gas and Electric Company, for which extensive additions and improvements are contemplated.

The Minneapolis General Electric Company, of that city, is making a number of improvements in its plant. Recently a new 1,500 horse-power engine was added, and about $7,000 worth of leather belting has been contracted for. Among the belts to be purchased is one that is nearly as large as any other in the world. It is to be 72 inches wide and 130 feet long.

A meeting of the directors of the Windsor Locks, Conn., Electric Lighting Company was held last week. All the directors, with two exceptions, were present, and they voted unanimously to borrow money with which to increase the capacity of the light station. A new 150 horse-power boiler and a new 100 horse-power engine will be put in, the dynamos increased from the present capacity of 1,500 to 3,000 lamps, and better service will be assured, and there will be power enough so that all who want lights can have them.

The General Electric Company's plant at Schenectady, N. Y., is feeling the effects of the depression in the money market, and has laid off its entire night force of 300 men and discharged a number of its day employés in consequence. The company noticed that big orders dropped off very rapidly when the first signs of general financial distress appeared, and the reduction of the force will hold good until money becomes easier. A more extensive reduction in the day force is anticipated unless there is a marked improvement in the industrial market very soon.

Testing for Arsenic.

In cases of medical jurisprudence it is, says *Industries and Iron*, unfortunately often necessary to test for arsenic. It was, and we fear still is, usual to use zinc to produce arseniureted hydrogen. There is great difficulty in procuring zinc absolutely pure and free from arsenic, and as the least trace of arsenic in the zinc might result in untrue evidence being given, which might cost the life of a human being, it seems strange that such a test should ever be used now. It is obvious that zinc should not be employed. A small battery with platinum electrodes will produce the arseniureted hydrogen, if there is any arsenic present, without risk of any misleading results due to impurities. This method was proposed some time ago, but we believe the dangerous method with zinc is not yet superseded, owing to the conservative dread of anything new—especially anything electrical.

Latest European Electrical News.

DEVELOPMENT OF PHOTOGRAPHIC PLATES.

It is stated that M. Liesegang, of Düsseldorf, has succeeded in developing photographic plates by electricity. His method consists in combining a process invented in 1869 by M. Schützenberger, and improved by M. Eder in 1886. The inventor uses a nearly concentrated solution of sodium bisulphate, into which two platinum electrodes are plunged, separated by a porous diaphragm. The current is derived from six dry batteries (Gassner cells). When a photographic plate is immersed a few minutes into the liquid surrounding the negative electrode, the image is rapidly developed, assuming, however, a brownish-red color. The decomposition of the liquid does not interfere with the developing of the plate, as the decomposed elements recombine under the influence of the current. According to the *Moniteur Industrial*, the image becomes somewhat indistinct in the fixing bath, but still retains its brownish hue.

TELEPHONIC TRANSMISSION BETWEEN PARIS AND LONDON.

L'Electricité contains a long article on this first international telephone line. We quote from it the following paragraphs:

The ever-increasing traffic over this line proves that its construction was imperative.

It is now possible to transmit 450 words for 10 francs, while the telegraph charges the same price for 48 words. Of course, the latter prints the words, establishing a permanent record of the message. On the other hand, the telephonic service transmits for an equal charge from 400 to 500 words without such a record.

The line between Paris and London works admirably, especially at night, when the weather is fine and the air not saturated with electricity, there is scarcely a trace of induction; or, in other words, the line is absolutely free from disturbing noises and cracklings. In fact, the transmission between the two capitals is so good, that the employés who receive the messages and record them in shorthand, have rarely an occasion to ask for a repetition of a sentence. The rather interesting fact transpires that for telephonic intercommunication the French language is far superior to the English, which has too many nasal sounds. This fact is emphasized in the *Bulletin* of the Association of French Stenographers. Take, for example, the French words "cérémonie," "président," and compare with those their equivalents in English, *i. e.*, "ceremony," "president." Each English word has an accentuated syllable, or a syllable which is distinctly pronounced to the disadvantage of the remainder of the word. In fact, it is this accentuated syllable which gives the English word its characteristic. Indeed, in English polysyllabic words, one syllable is distinct, while the others are swallowed up by the speaker. The consequence is that in a large number of similar English words the employé, or person who receives the message in Paris, is prone to make serious mistakes. Take, again, the words "president" and "present," both being accentuated upon the first syllable, it is by no means unusual that they arrive at the Paris end of the line as "prez'nte" or "prez'ne." On the other hand, the French word "cérémonie," having four distinct syllables, is easily understood at London, while the word "ceremony," with one accentuated syllable, will be quite indistinct whenever the line is not absolutely free from induction.

GERMAN TELEGRAPH STATISTICS.

The *Elektrotechnische Anzeiger* gives the following additional details concerning the Weiner Privat Telegrapten Gesellschaft for 1892: The net receipts from telegraphic service amounted to 14,025 florins, and 1,095 subscribers were added during the year. As an average the exchanges made daily 40,000 connections between subscribers, or 14.9 millions per year. After setting aside 80,589 florins for a reserve fund, the net receipts from the telephone service of the city proper amounted to 177,782 florins. The company sold its Brünn exchange to the government for 90,000 florins, but as the former cannot issue new series of shares, the directors agreed to withhold the usual three per cent. extra dividend.

The H. W. Johns Manufacturing Company at the World's Fair.

One of the handsomest exhibits in the west gallery of the Electricity Building is that made by the H. W. Johns Manufacturing Company of its insulating materials. These are principally vulcabeston, molded mica, "Monarch" and asbestos. The materials are displayed in a great variety of forms in show cases; the larger pieces, such as magnet spools and pieces of apparatus which illustrate the applications of vulcabeston, are piled in pyramids, or similarly arranged. A striking effect is produced by an urn-shaped arrangement of globe strain insulators, which is situated near the center of the space. A very comfortable office has been provided by the erection of a tasty Grecian structure at the end of the enclosure, facing the main hall. At the opposite end of the

THE H. W. JOHNS MANUFACTURING COMPANY'S WORLD'S FAIR URN, COMPOSED OF STRAIN INSULATORS.

space is a handsome oak counter, from which vulcabeston and asbestos samples are distributed. Near the center of the space is a large sample board containing specimens of the trolley line insulators sold by the company. These consist of the round top, swivel, iron-clad bell, Salem bell, bracket arm hangers, globe strains, the new sheet mica double strain insulator, and the various other pieces which must necessarily be included in a full line of trolley insulating materials. A large number of vulcabeston samples are shown. Vulcabeston is a composition of asbestos and India rubber, vulcanized. It is exceedingly tough and strong, and excellently adapted for use in the form of magnet spools, bushings, washers and similar pieces which may be subject to mechanical injury, as evidenced by the large number of samples exhibited.

The different sizes of spools which have been furnished to various manufacturers are displayed on a platform near the office. These form an interesting collection, the most noteworthy specimen being the huge spool of the Eddy Electric Manufacturing Company, of Windsor, Conn. Near these spools is a Gramme ring armature core of the Excelsior Electric Company, covered all over with vulcabeston, and making a very handsome display in itself. The large Westinghouse generators which light the thousands of incandescent lamps which illuminate the Exposition are insulated with vulcabeston.

The most striking feature of the exhibit, as seen from a distance, is a large electric sign which, at brief intervals, alternately displays the legends "Insulation" and "H. W. Johns Manufacturing Company," in red and white lamps. This sign, the white Grecian structure, and four globes which stand at the corners of the space, enable the exhibit to be readily recognized from almost all parts of the building.

Samples of insulated apparatus are also included in the exhibit, which serve to illustrate the applications which have been made of vulcabeston and the various other insulating materials made by the Johns Pratt Company, and sold by the H. W. Johns Manufacturing Company, as its selling agents. A registry book is provided, in which all visitors are requested to put their names. As a souvenir the company is distributing a little pamphlet, entitled "Insulation," giving a description of the characteristics of its insulating materials, and also a catalogue of the more prominent pieces.

Mr. H. A. Reeves, of the Chicago office of the company, 240 Randolph street, is in charge, with Mr. Martyn F. Warner as assistant. The manager of the company's electrical department in New York, Mr. W. F. D. Crane, expects to visit the Fair during the last two weeks in August.

LITERARY.

"Reports From the Consuls of the United States" for July, 1893, have been received.

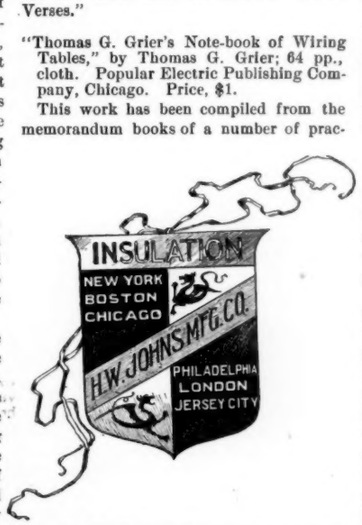
In addition to the fiction, the August number of *Scribner's Magazine* contains the fourth of the series on "Men's Occupations," Mr. Julian Ralph's account of the every-day life of "A Newspaper Correspondent." There is probably to-day no other working journalist in this country better able to describe the stirring life of that occupation.

"Ranch Verses" by "Larry" Chittenden. 189 pp. illustrated. C. P. Putnam's Sons, New York. Price, $1.50.

"The verses in this little volume are offsprings of solitude—born in idle hours on a Texas ranch." This is the preface to the "Ranchman Poet's" book. We envy him his "idle" hours when they are conducive to such sweet rhythm as he finds to tell about the breezy, sweeping prairie, and its open-hearted, free and easy people. The whole book teems with life of the healthiest kind. A gentle touch of sentiment, a bit of subtle humor and many good lines of description scattered here and there make every page interesting. "My old Friend, 'The Majah Green'" and "The Cowboy's Christmas Ball" are delightful, and well worthy the pen of Bret Harte or Eugene Field. To those of our readers who are in search of pleasant summer reading we cannot do better than recommend "Ranch Verses."

"Thomas G. Grier's Note-book of Wiring Tables," by Thomas G. Grier; 64 pp., cloth. Popular Electric Publishing Company, Chicago. Price, $1.

This work has been compiled from the memorandum books of a number of prac-



THE H. W. JOHNS MANUFACTURING COMPANY'S WORLD'S FAIR COAT-OF-ARMS.

tical engineers, with the addition of several original tables by the author. While it may not be necessary for an expert engineer to have a number of tables to enable him to ascertain the size of wire for different purposes, it is no doubt quite convenient at times to have such tables as will facilitate a speedy calculation. This book contains a total of 36 tables. Every engineer or electrical worker whose business requires tables for electrical wiring, will find within the covers of this book some tables with which he is familiar and alone worth to him the price of the book. The theory of the wiring table is clearly demonstrated and explained. Concise and practical definitions are given of the terms upon which wiring tables are based. The Cook-Grier wiring table is one that, when thoroughly understood, is a handy table for a man to have. Nearly all problems of transmission of electrical energy can be solved by the aid of this table.

Electric Lighting Powers in the United Kingdom.

FROM OUR EUROPEAN CORRESPONDENT.

There is ample material for reflection to be found in the English parliamentary paper just published in the form of a report by the Board of Trade, respecting the applications made during the past year to the Board of Trade, under the electric lighting acts, 1882 and 1890. It is scarcely necessary to mention that the object of the applications, which are made by companies and municipal corporations and other local authorities, is to obtain powers to establish electricity works and supply from them electrical energy for both public and private illumination. Applications are made for both licenses and provisional orders; a license may be for a period not exceeding seven years, when it may be renewed, but a provisional order has a direction of 42 years, at the expiration of which, the undertaking may, if it is desired, be acquired by the local authorities. Very few licenses are, however, asked for. During the past year there were only 18 applications for provisional orders; of these 11 were made by local authorities and the remaining 7 by companies. Of the 18 requests, 17 were granted, the other being refused because the local authority was already supplying the electric light. These provisional orders, granted by the Board of Trade, must necessarily be confirmed by Parliament by the introduction of bills for that purpose; and already several of them have been ratified.

More interest will, however, perhaps be manifested in the working of the electric lighting laws since the passing of the first electric lighting act in 1882, which was practically repealed by the electric lighting act of 1888. The figures will be more readily understood in tabular form, as follows:

Year.	No. of provisional orders granted.	No. of orders since revoked.
1883.....	69	60
1884	4	4
1886.....	1	1
1889.....	12	—
1890.....	74	11
1891.....	59	8
1892..... ...	25	—
Total.....	244	84

It will thus be seen that out of 244 provisional orders granted and confirmed by Parliament, no less than 84 have been revoked, this being due to various reasons for which those to whom the powers were given are responsible.

Apart from these provisional orders, 21 licenses were granted during the period 1883–1892, but of these only eight are now in existence. The reasons for the revocation of so many orders granted in the early years may be attributed partly to the inability of the undertakers to carry out the work within the time specified by law, owing to the reckless speculation in electrical patents between 1880 and 1883, and partly to the restrictions of the Electric Lighting Act of 1882. On the passing, however, of the Act of 1888, which removed those restrictions, and by which time confidence in electrical enterprises had been regained, it will be observed that the number of orders granted has increased until now most important towns in the United Kingdom possess electric lighting powers. Consequently, there are at present not so many orders being sought. It must, however, not be thought that the number of orders granted, as above mentioned, comprise all the applications that it was intended to make, as notices were given in from 300 and 400 additional cases of intentions to apply for powers, but the applications in these instances were not made. The present movement is in the direction of steady progress, and in this manner the best results will eventually be obtained.

The Erie Telegraph and Telephone Company announces that a quarterly dividend (No. 39) of one per cent. will be paid by check mailed to stockholders August 14, 1893, that are of record at noon, Saturday, August 5. The stock books will be closed at noon, August 5, and opened Monday, August 14, 1893.

ELECTRICAL REVIEW

Published at 13 Park Row,
P. O. Box 3329. NEW YORK.

EDITOR:
CHARLES W. PRICE.
ASSOCIATE EDITORS:
STEPHEN L. COLES.
ROBERT H. READ.

REGISTERED CABLE ADDRESS:
"ELECTVIEW," NEW YORK.
1546 "CORTLANDT," TELEPHONE CALL.

BOSTON OFFICE:
H. G. TUCKERMAN, Room 29, 620 Atlantic Ave.
CHICAGO OFFICE:
MERWIN J. BULKLEY, 435 "The Rookery."
WASHINGTON OFFICE:
GEO. C. MAYNARD, 1409 New York Ave.

ADVERTISING DEPARTMENT,
H. T. RICHARDS, Manager.

SUBSCRIPTION TO THE
ELECTRICAL REVIEW.

One Year, United States and Canada, - $3.00
One Year, Foreign Countries, - - 5.00
Single Copy, - - - - - - - .10

NEW YORK, AUGUST 12, 1893.

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It is interesting to note that owing to the falling off of receipts due to the competition of the trolley roads, the Brooklyn elevated railroads have succeeded in getting the assessed valuation of their structures reduced from $200,000 to $170,000 per mile for purposes of taxation.

Dr. Assman and Dr. Boens have arrived at the conclusion that most persons struck by lightning, and to all appearances dead, could be recalled to life by applying the method of artificial respiration in use for resuscitating the drowned. This is another argument why electrocution is not a certain nor humane method of execution.

There is no quality so essential to the inventor's success as a certain secrecy of manipulation, if he desires a pecuniary reward for the product of his brain and ingenuity. The day has past when inventors worked for glory. When a field is comparatively new the inventor is reasonably secure of his achievements in the beginning, but after he has "staked his claim" it takes a little more than a mere declaration of ownership to keep off trespassers. Secrecy from prying eyes is the means toward the end; for he who tries to reform the world has a hard task before him. Several prominent inventors are now pursuing this plan, and they confidently state that "it works to perfection." In other words, experience has made them wiser.

An indirect and very sad result of the latest bungling electrocution is that produced upon the mind of Mrs. J. M. Alvord, of Rochester, N. Y. She imagines that the Brush Electric Light Company has decided to use her body as a meter to measure their current, and she fears it will kill her. She applied to the court for an injunction to restrain the company from making such use of her person. In response to an inquiry by the Judge as to why she thought the light company had selected her as a subject, she replied that she was a woman who lived an exemplary life, and the company thought her a good person upon whom to try their experiments. This is indeed a pitiful case. How much longer must we tolerate the iniquitous electrocution law and its train of attendant evils?

LIGHTNING ARRESTERS FOR TELEPHONES.

We publish on another page of this issue the first installment of a paper on "Lightning and Strong Current Arresters as used for the Telephone," by I. H. Farnham, electrician of the New England Telephone and Telegraph Company. A subject of such importance as this cannot be passed over lightly. Protectors are devices which may be classed as necessities, where the introduction of the telephone or other labor saving inventions has been on such a scale as to warrant their being more than mere conveniences; in fact, like the protectors themselves, rapid business transactions have made the telephone a necessity. The study of the history of the progress of the protector is interesting. The developments have been gradual, and it is at first difficult to imagine how a subject apparently so simple should prove to be one so full of intricacies and unforeseen difficulties. Several of the protectors mentioned in the article are the invention of Mr. Farnham, who has had much experience in their use. We have no doubt that all telephone people will be interested in this paper, which contains many points which will doubtless be of service to them. No company has labored on this problem or reached results so satisfactory to the insurance underwriters as the New England Telephone and Telegraph Company.

WELLS FOR POWER HOUSES.

News comes from an authentic source that in the quiet little village of Northampton, Mass., once made famous by the ever-to-be-remembered bank robbery, efforts have been made to supply the engine at the power house of the electric road with water by damming a brook near by. The supply, however, was not large enough, and the men are employed in sinking a well. The disappointment is said to have been great, for a dam is ever so much cheaper than a well; it is to be remarked also that as a word for expressing disappointment the former seems to have the preference by a large majority. A well, however, is much more reliable, and even in large cities those power-houses of great size would be benefited, as well as would the other water consumers, by independent wells. Much money can be saved in this way, for although the initial expense is considerable, the consequent cheapening of the water supply will more than compensate for the additional investment.

STREET RAILWAY FRANCHISES.

The question, what shall be the compensation for the bestowal of a street railway franchise? is one productive of much discussion. In many cases this is accomplished on a percentage basis; in those towns which are on the boom, the projectors or city fathers are only too anxious to obtain such a valuable improvement to their little place as is an electric road, and in several towns in Massachusetts the franchises are granted merely for the compensation of the company's watering the streets through which their lines run. This is an excellent idea, for in conjunction with the proviso that the streets shall be repaved and kept in repair by the company obtaining the franchise, a thoroughfare is obtained which, if the street commissioner does not neglect his duty, should be a strong element in favor of the general introduction of trolley lines throughout all of the small cities in densely or even moderately sparsely settled districts.

The collapse of the pulley at the Elkhart Electric Company's plant at Elkhart, Ind., suggests that such accidents are not to be unexpected in electrical plants. The spokes of the iron driving pulley all broke at one time, and very nearly half way between the rim of the wheel and its hub. The suggestion has been made that the iron of the spokes had become polarized by the continued action of the electrical current, and that the part where the break occurred had been weakened by the polarization.

LETTERS FROM A LABORATORY. LVII.

BY JULIAN A. MOSES.

The foundations of most superstitions have their origins in some incidents or series of circumstances which, although true and natural in themselves, have been given false attributes or surroundings which have grown as they passed from one person to another, until the simple fact is metamorphosed into a superstition which has no semblance to anything real. Sometimes, however, a simple fact has been so perverted by an ignorant person that although it is true, some other significance is given to it, which, in a measure, prevents the scientists from investigating what might otherwise prove of value to those who have no faith in superstitions.

Many instances could be given in support of this theory, such as are only too common among civilized people; in fact, who is there who is entirely free from superstition. "Let him who is guiltless cast the first stone." Many superstitions have a poetic origin, but there is little in these to interest scientific readers, except in their relation to natural laws and to what little help they may give in the way of offering a chance for explanations.

We all have heard of the jewel situated in the head of a toad, in fact, Shakespeare alludes to it, saying, "Which like the toad, ugly and venomous, possesses yet a precious jewel in its head." We have heard also of the many plausible explanations offered, and the fact that there are many plausible ones prevents us from believing any one of them.

In India there is a common superstition to the effect that the jewelled cobra, a most poisonous reptile, can never be found without its precious stone. The natives assert that as soon as a cobra loses its stone or has it taken away it eventually dies a lingering death or commits suicide. These snakes are rather rare, otherwise this superstition would have ceased to exist; however an entomologist of an inquiring turn of mind and a dabbler in electricity, recently returned from India, tells the following incident showing how electricity can even serve the double purpose of exploding mines and false theories.

It appears that he was anxious to catch a number of Indian fireflies, and as a decoy he used a half candle-power incandescent lamp, current being furnished by a small sulphate of mercury primary battery. The battery and lamp he deposited upon the ground in a neighboring thicket or jungle and awaited developments. It should here be mentioned that only the male fly is provided with the brilliant light, while the female gives but a faint glow, and does not leave the ground.

The first night that the lamp remained on the ground very few of the male flies came near it. This he surmised to be due to the fact of the light being too intense; so the next night he set the decoy again, dimming the lamp, however, by covering it with some tissue paper.

He laid this down by a tree and, net in hand, awaited the coming of the male flies. They came, too, in short order, and in quite a little while he had secured a fine lot of specimens.

Suddenly, however, the air was free from flies; they disappeared as if by magic. Just then the entomologist, thinking that the cause of their sudden departure must be due to something unusual, looked down to see if the light was still burning. It had gone out. Stooping down, in the darkness he placed his hand where he thought the lamp ought to be, and, to his great horror, he found that he had touched the moist skin of a living cobra. The reptile had swallowed the lamp, thinking it to be a "cobra's jewel."

It is almost needless to say that there was a mutual surprise, but it is comparatively easy to tell which was the more frightened.

The snake slurried off, and as the battery was a little too heavy for him to drag along, the wires being strong the lamp was forcibly removed from his mouth.

This incident led to an investigation, and it was found that the cobra, while young, makes a search for a phosphorescent pebble, composed probably of barium sulphide, which, upon being slightly heated, produces a light which resembles that emanating from the female firefly. This he lays upon the ground immediately in front of his mouth, and as the winged insects approach they become an easy prey to this most venomous reptile.

CORRESPONDENCE.

WORLD'S FAIR NEWS.

The Jurors for the Department of Electricity now have temporary quarters in the offices of the department at the southern end of the Electricity Building and are now in session attending to preliminary work necessary before making the examination for final awards. Prof. H. S. Carhart, of the University of Michigan, at Ann Arbor, as president, and W. E. Anderson, of the Virginia Agricultural and Mechanical College, of Blacksburg, Va., as secretary, were elected at the meeting this week.

The Western Electric Company have completed their new scenic theatre, which is located in the extreme southeast corner of Electricity Building. The new theatre is on a much larger scale than the first one which they constructed in the building and has a seating capacity of over 100 people. No admission will be charged. The scene, which is one in the Alps, is very beautiful, and with the grand lighting effects which will be produced, is sure to attract the attention of visitors to this building.

The Westinghouse Electric and Manufacturing Company were recently given additional space in Electricity Building, and are now busily engaged installing the balance of their exhibit, which will consist principally of motors, dynamos, switchboards and station apparatus of all descriptions. With this increased space this company will occupy as much as taken up by the exhibit of the General Electric Company, and it is safe to say from present appearance that when everything is placed their exhibit will be second to none in the building.

There is No Spot within Electricity Building, at Jackson Park, where one can enjoy solid comfort more, now that the heat is so intense, than viewing the exhibit of L. J. Wing & Company, of 125 Liberty street, New York. Their space is located in the northeast corner of the building on the main floor, and the gentle breezes furnished by their fans in operation is most refreshing. Within the railing enclosing their space is shown ventilating fans of all descriptions. In the center of the space is a pavilion built of solid oak, containing several fans arranged to show their power, either for exhaust or pressure force. A Perrett motor, of four horse-power capacity, made by the Elektron Manufacturing Company, of Springfield, Mass., is placed within the pavilion, which is belted to a countershaft or the roof truss. This also furnishes power for a 48 inch exhaust fan placed horizontally in the ceiling, one 12, two 18 and one 36-inch fans placed on the front wall and upon top of the pavilion. Near the pavilion door is a 36-inch Wing disc fan coupled direct to a Diehl motor, while suspended from above is a Diehl ceiling combination fan, and, together with desk table and a Meston alternating current motor and fan, make a most delightful breeze in the vicinity of their exhibit. The exhibit was arranged by F. H. Gottlieb, who will be in charge during the Fair, and has succeeded in placing a large number of fan motors for his company throughout the buildings.

The Latest Addition to Electricity Building in the way of an exhibit is an electric incubator by which chickens and ducks are hatched all hours of the day and given away to visitors as a souvenir. The incubator is manufactured by H. W. Axford, of this city, and is run by a storage battery which is changed every 24 hours when impossible to obtain direct current. The incubator is equipped with automatic regulators to keep the heat a certain temperature and requires but 19 days to hatch the eggs, which is from two to three days better time than required to hatch under a hen. Mr. Axford has manufactured incubators several years, but says he secures better results from the electric incubator than any made previously, and has applied for patents on the same. M. J. B.

Chicago, August 5.

OUR CHICAGO LETTER.

Carl Cammeyer, of the Jenney Electric Motor Company, Indianapolis, Ind., is spending this week at the World's Fair.

James H. Mason and A. W. Morrison, of New York, visited this office while here this week, viewing the sights at Jackson Park.

J. F. Macartney, formerly salesman with the Railway Equipment Company, has accepted a position as engineer of the Norfolk Street Railway Company, Norfolk, Va.

People on the North Side will soon be happy, as the Edison Electric Company, which has for some time been at work installing an electric plant in the Newberry library to furnish them with electric lights, report the plant nearly completed. Over 20 miles of wire has been laid and the company expect to be in position to start the plant August 10.

W. H. McKinlock, president of the Central Electric Company, this city, has retired from active business management of the company and intends to spend much time in traveling. Mr. McKinlock's first trip will be to Europe and he sailed on the "City of Paris," on July 23. His many friends unite in wishing him a most enjoyable trip. M. J. B.

Chicago, August 5.

A New Telephone Transmitter.

Le Matériel Electrique, the new supplement to *L'Electricien,* contains an item concerning a new magneto transmitter, specially constructed for military purposes, and invented by Captain Charollois. It is said that careful and highly satisfactory tests which have recently been made near Joinville-le-Pont with this transmitter have proved its superiority over the instruments generally employed. It may be well to point out to the readers of the ELECTRICAL REVIEW that Captain Charollois is not a new comer in the field of telephonic inventions. As early as 1890 the French papers gave an account of his magneto receiver, whose efficiency was thoroughly tested in the grand manœuvres of the year 1891, giving universal satisfaction to the commanding officers. His latest invention, as stated above, consists in the construction of a powerful magneto receiver, and one of its characteristic features seems to be the ease and accuracy with which the distance between the diaphragm and the poles of the permanent magnet can be regulated or adjusted. According to our informant, the experimenters at Joinville talked easily over several kilometers of a bi-metallic uninsulated conductor (system Martin), its diameter being but three-tenths of a millimetre. Considerable stress is laid upon the fact that the bare conductor was simply laid upon the ground.

Recent German Patents.

Furnished to the ELECTRICAL REVIEW by Dr. H. Zerener, Berlin.

K1. 21 F 6553. Electrical machine with regulating apparatus. Julius Fries in Heidingsfeld, b/Würzburg, Bayern.

K1. 21 L 7437. Method for the technical producing of the generated heat at the galvanic polarization. E. Lagrange and Paul Hoho, in Brüssel.

K1. 21 P 5850. Telephone—apparatus for the transmission of notices from one place to a greater number of hearers. Theodor Puskas, in Budapest.

K1. 21 No. 15472. Nib of carbon pin for electric arc lamps with two arc slides. Berliner Electro-technische, Fabrik Bauer & Betzt, in Berlin C.

K1. 21 No. 15564. Hanging apparatus for incandescent lamps with conducting tube. Ritter & Uhlmann, in Basel.

K1. 21 No. 15566. Switch for electric conducting construction. J. Berliner, Telephonfabrik, in Hanover.

Complaints against the "rapid transit service" (heaven save the mark!) of the Broadway cable road are pouring in fast and furious. With accidents, delays and slow time, New Yorkers are justly unpleased.

These are treacherous days for prophets. If we dared, we might say that it looks as if the worst of the financial storm was over, and that daylight was beginning to break. But we're a little afraid to say anything about such matters now.

M. D'Arsonval's Physiological Experiments with Induced Electric Currents.

TO THE EDITOR OF ELECTRICAL REVIEW:

I have read with interest the paper written by Messrs. Frederick Peterson and A. E. Kennelly, but I entirely fail to see that their experiments with low frequencies (280 magnetic reversals to the second) demonstrate the non-effect of magnetism on living organisms, and, indeed, I find that the experimenters themselves admit the insufficiency of their tests. I beg leave to call to your attention a paper, first published in *Comptes Rendus,* t. CXVII, p. 34 (republished in full *Journal Universal D'Electricité,* July 22, 1893, pp. 136-137), which details M. d'Arsonval experiments on a living being subjected to the effect of induced electric currents, and also describes the apparatus the author uses for the measurement of magnetic fields produced by high frequency currents. Having fully described the arrangement and several pieces of apparatus he employs, he writes: "The charge is periodically produced by a transformer of about 15,000 volts. The latter is energized by a Siemens' vibrator having no iron, and arranged to give a maximum current of 12 amperes and 350 volts; its frequency is 60 periods per second. Under these conditions the inductive effects of the solenoid on any body placed in its inside is simply marvelous. This will be shown by the following experiments."

The way M. d'Arsonval measures the strength of various magnetic fields is highly ingenious. Inside of a little solenoid, serially connected with the large one, used for experimental purposes, he places a mercury thermometer. Of course, the mercury becomes the seat of Foucault currents, which rapidly heat the metal, and the rise of the quicksilver column measures the strength of the field. Again, this simple device enables M. d'Arsonval to operate at will with exactly the same strength of a magnetic field. For weak magnetic fields he employs a coal oil or an air thermometer, whose bulb is surrounded by a copper tube. The Foucault currents induced in the copper tube cause the coal oil or air to expand, etc. I believe many of your readers are highly interested in these researches.

Yours very sincerely,

Boston, Aug. 2, 1893. B.

GENERAL NOTES.

"Journal of the Institution of Electrical Engineers for July, 1893," has been received.

"Register of the Engineering Department of Vanderbilt University for 1892-3" shows that a very good course in electrical engineering is provided by this splendidly endowed institution.

A very readable account of the foundation, character and equipment of the Massachusetts Institute of Technology, has been prepared in connection with the Institute's exhibit at the World's Fair.

The Suburban Illuminating, Heating and Power Company, of Newport, Ky., have begun an overhauling of their entire system by lighting the city. Monmouth street was the first to receive attention. New lamps and wires have been placed in position in place of the old ones.

The Pennsylvania Railroad operates 14 switches from one tower by the usual lever system at Conemaugh, Pa., the greatest bunch of switches for operation from one point between Pittsburgh and Altoona, and will shortly put in the appliances for operating them by electricity.

The three-trolley electric locomotive built by the General Electric Company, for the Baltimore & Ohio, for use in the Baltimore tunnel, is a success, and orders for additional ones will soon be placed. The regular single trolley electric locomotives built by this company, one of which is on exhibition at Chicago, are 16½ feet long, 11½ feet high and 8¼ feet wide, and built to make about 30 miles per hour. These locomotives are intended for light elevated work, but it is only a question of time, and a short time at that, until they will be designed to make much greater speed, and for ordinary railway service.

Wall Street and the Electrical Stock Market.

The general feeling in financial circles was considerably better in Wall Street last week than it has been for a long time. The return of gold from Europe set in, and the opinion is expressed that $40,000,000 or $50,000,000 will come back before the tide is stemmed.

General Electric was much stronger. Whether this was due to the rumor that Drexel, Morgan & Company were said to have obtained control of the company, or whether the payment of its two per cent. quarterly dividend produced the good effect, cannot be stated. The company is said to have $1,500,000 cash on hand.

The gross passenger earnings of the West End Street Railway, Boston, for July were $633,369, against $596,157 for July, 1892, an increase of $37,212. This was the largest month in the history of the road.

The fact that paper currency commanded a premium was one of the peculiar features of last week; one per cent. was freely offered. General Electric closed on Saturday at 50¾; Western Union closed at 78⅞.

The Boston *News-Bureau,* says:

The continued buying of securities in small amounts is finally having effect, and this class of buying is not only of that kind that has not been witnessed for years, but is also of that kind that holds for big money.

The situation is gradually correcting itself through these purchases, the importation of gold and the increased bank circulation. We need that confidence which will bring out currency. When the banks begin to pay bills freely people will have no incentive to hoard them.

We have arrived at that point where business between centers is practically suspended. The situation has probably seen its worst, and a quiet rebound from present conditions should follow.

In Boston ⅛ and 1 per cent. above New York prices has been paid for New York investment stocks delivered in Boston and payable through our local clearing house.

There has been considerable criticism of Secretary Carlisle as a financier, and it is perhaps just to Mr. Cleveland to say that Mr. Carlisle was not placed in the Cabinet because of his abilities as a financier, because he never had any. President Cleveland is under the impression that he was elected upon the tariff reform issue, and Mr. Carlisle is considered one of the greatest experts upon the tariff in this country, and was therefore placed at the head of the Treasury Department, and the financial issue was unexpectedly precipitated upon him. These are the true facts of the case.

The Edison Electric Illuminating Company, of New York, makes the following showing for the six months ended June 30:

	1893.	1892.	Inc.
Gross.....	$609,955	$445,052	$164,903
Net	282,302	225,566	56,736

The Banks of New York.

The metropolis of America is fortunate, during these days of money stringency, in having so many strong and ably conducted banks. A New York daily recently reviewed the banks of the city, their history, number and amount of deposits, and the array presented was one in every way to be proud of. The largest bank in New York, and that means in the United States, is the National Park, and probably no bank ever possessed the confidence and respect of its depositors to a higher degree. The Chemical, the First National, the Fourth National are all great financial institutions of the city, and dozens of others could be named to be classed with the carefully and successfully conducted banks.

The New York banks, in addition, have a way of standing by one another (witness the Clearing House certificates) that is productive of great good in times like these, and has a beneficial effect on the entire country.

PERSONAL.

Mr. John M. Baker has been appointed superintendent for the Central Union Telephone Company for the State of Indiana, dating from August 1, 1893, *vice* Mr. C. F. Barnes, transferred. Mr. Baker's office will be in Indianapolis, Ind.

Austrian Delegates to the Electrical Congress.

In response to the invitation extended to it to participate in the Electrical Congress, to be held in Chicago, the Electrotechnischer Verein, of Vienna, has appointed the following of its members delegates to represent it at the meetings: Nikola Tesla, A. Prosch, Inspector of the Austrian State Railways; Ernst Egger, Dr. Johann Sahulka, Constructor at the Imperial High School, Vienna; Fred. W. Tischendörfer and Joseph Wetzler.

The Fakir's Silver Tongue.

NO WONDER THE FASCINATED FARMERS BOUGHT HIS ELECTRIC BELTS.

There are some delights vouchsafed the inhabitants of villages and small towns that the metropolitan resident knows not of, and not the least of these is the sweet singer of curealls, the night hawk of universal panacea. He must not be confused with the small and base imitator of the metropolis who vends a corn salve on a Bowery or other populous corner until an unsympathetic police officer orders him to move on. This delight of the villager is mounted high upon an imposing platform, lighted by flaming torches, and attended by a musician, sometimes a whole band of them. In fact, he makes an obstruction for which there is no tolerance in the streets of the metropolis.

One of the dearest of his kind was observed in a New Jersey town recently by a *Sun* man. The fakir was selling an "electric" belt, which was guaranteed to cure anything from that tired feeling to homicidal tendencies. His attendant, a banjoist, for diversion and general utility man when required, was a bright, but hard-faced young man, whom the "Doctor" referred to as "Professor," but confidentially addressed as "Tom." The fakir's stand was built in the center of a large open lot on the outskirts of the town, and the lot, soon after dark, was well filled with a crowd of men who made a curious mixture of mill hands and small farmers, their wives, sweethearts and children. The Doctor, it was easy to see, was esteemed by his audience a great and wise man, and the Professor, especially when he played his banjo and sang, was adored by the women and children. The Doctor was a glib-tongued Yankee, with an Uncle Sam cut of beard and a silk hat having the flat brim affected by the Paris art students, but which the Doctor had evidently worn since its really fashionable days.

His first care was to convince his hearers that all of them were afflicted with ailments which his belt was peculiarly designed to cure. It was amazing how easy a thing it seemed to be to convince those people they were all invalids. "Woe betide the man or woman, I say," shouted the fakir, "who, proud in the strength of his youthful beauty, madam, defies the ravages of the worm that stingeth like an adder, as the good Book says, well knowing as I do that there be those who in their sinfulness and pride, which cometh in the fall, deems himself superior to religion, and though his Christianity teaches him he is sick, yet will he defy the germs lurking in the very air we breathe, the water we drink!"

That was convincing, and realizing that he might strengthen his effect with a touch of sentiment the doctor turned to his assistant and said: "The Professor will now oblige us by singing a few verses of that beautiful melody, 'Golden were her tresses, but we laid our child away.'" And the Professor did sing several verses in a voice not at all bad, considering that it was nightly called upon to fill all outdoors.

While the Professor was singing, accompanying himself on a banjo, the Doctor was setting up in a small trunk a small electric battery which he attached by wires to a couple of pieces of metal sunk in what he said had been a belt. When the song was sung the Doctor held up his piece of belt and said:

"Now, ladies and gents, it ain't no use my spoiling a new belt every time I produce this wonderful, this marvelous experience in the beautiful science of electro-magnetism, which is why I use this old belt over again, for, as the prophet wisely says, a stitch in time saves a penny. Now, if two gentlemen will step upon the stand I will show the assembled multitude what I mean when I say that this belt which I offer to you this evening is indeed the nineteenth wonder of the age, absorbing as it does the effluvia of such microbes as beset humanity, which is poor at best, and by the alternating process discovered by Mr. Morse, so reviving the most exhausted in mind and body that the blind may see and the halt may cast their crutches at the thieves in the temple, removing at the same time all beams from the eye. Will two gentlemen step forward?"

After much urging and bashful hesitation two men did step upon the stand. One was a man from the iron mills, a lusty, big fellow, beneath whom the stage creaked; the other, a farmer's son, gawky, strapping, blinking. They were both greeted by name by the delighted crowd, and advised not to be afraid.

"Now if you two gents will place your hands on these pieces of metal I will produce a sensation which you, describing to your friends in the multitude, will convince them more than any word of mine that what I say of my anti-microbe belt is the welcome truth for which their disease-racked bodies have long been a-thirst. For what is it the Bard of Avondale says?

> "Hung be the heavens with black;
> A man's a man for all of that,
> Withered limbs and aching back,
> Bubble, bubble, there's the trouble!

"Surely a man cannot deny an old master, and if the divine William was not an old master, why, as the member of the House of Lords said when he'd been drinking too much tea in the Tower of London: "Where is my 'at?" Now, Professor, if we are all ready, give the gentlemen a gentle shock."

The crowd became very quiet; the men stood, looking very foolish, their big hands on the metal disks, but there was something wrong with the battery. The reporter walked around to the rear of the stand to see if he could make out what the trouble was.

"The Professor," continued the fakir, sparring for time, "has to adjust to a nice equilabarium the delicate electrodes which represent at one and the same time the moisture of the body and the perspiration of the skin."

Then aside: "Can't you make the darn old thing go, Tom?"

"No; there's something missing yet, but I don't know what it is," answered Tom.

"The Professor informs me," shouted the Doctor, "that the negative jar indicates a feverish tendency in what we medical men term the sanguine pulsations of this gent here," putting his hand on the shoulder of the young farmer, who was as red as a boiled lobster, and dripping with perspiration. "Am I right in my dagnostics, sir? Are you warm?"

"You bet I be," blurted the subject, and the Doctor had scored a point, but the electric current would not start.

"That being the case, I must assist the Professor in his adjustments."

He leaned over Tom and whispered: "Never mind the dog gasted thing; I'll go on with the talk and when I give you the tip jab a needle in the hobos' legs. They're so flabergasted they'll think it's a shock."

Then he faced the crowd and continued: "We have fixed the adjustment so that the polarization should combine the circuit in a brief minute. In the meantime let us be patient, for as the brave mariner takes the altitude of his ship by the polar star, what would become of us if he were impatient?"

Tom had moved behind the "hobos." The doctor suddenly threw his hands in the air, a trick to attract the attention of any who might be looking at Tom, and shouted: "I should judge by this time the circuit is complete."

Both the men jumped in the air and howled. There was a sensation in the crowd.

"Did you feel a shock? You should have felt it in your legs," observed the fakir, addressing the victims. They both answered satisfactorily by rubbing their legs.

"It is indeed marvelous, marvelous!" exclaimed the fakir, taking a bundle of the belts and handing one down to a man who passed up a bill.

"Electricity is light, it is fire; and does not our classics teach us that when the foolish maidens of Ireland let their lamps of fire go out they were dashed over the cliff dwellers? Think of it! A hundred years ago a king could not buy a match with all his wealth, but now any one of you can buy one of these belts, the fire of life, as has just been attested by your friends, for two dollars."

He was selling them fast now.

"Surely, while there is fire there is hope, and no longer need we leave undone those things which we ought to have done, for there is health in us."

And so he rattled on until the ultimate customer had been captured, and then the people slowly went away.

"What made those hobos jump so, Tom?" asked the Doctor of the Professor as they were packing their trunk.

"I didn't have a needle, so I had to jab 'em with a knife," answered Tom.—*New York Sun.*

Rapid Transit and The Advent.

Rev. A. J. Wheeler, pastor of the Advent Christian Church, of Boston, recently preached a sermon on "Rapid Transit." The pastor's idea appeared to be centered chiefly upon the fact that electricity and rapid transit are closely connected, taking from this a significance of the fulfillment of Old Testament prophecy. He read from Daniel, where it is said: "Many shall run to and fro, and knowledge shall increase," and upon similar prophecies he based his remarks.

"Rapid transit," said he, "is the fulfillment of God's prophecies. It was what he spoke of to those prophets thousands of years ago.

"Rapid transit is not simply for the development of commercial interests. I believe there is a divine economy associated with it.

"God has made these electric cars, these electric wires, His agency to fulfill the promise of that great day of days, when the trumpets shall sound and when the dead in Christ and those on the earth shall rise to meet him.

"God has arranged everything for this day through this agency; the rails are laid, the wires are stretched. The lightning of the heavens shall meet with the lightnings of earth. He has made the earth ready for that day of the second coming, that we shall be ushered into the new kingdom. The wires, the cables are all slaves to Him, and when He bids them move they will bow to Him."

The Business Situation Among the Electrical and Allied Interests.

ECONOMY THE ORDER OF THE TIMES.

By orders from the New York office, 18 of the best machinists of the Union Metallic Cartridge Company works, in Bridgeport, Conn., were discharged last week.

The Bryant Electric Company, of Bridgeport, Conn., is now working on half time. The company has large orders, but on account of the dullness of the season the fulfilment of them has been postponed. The employés work only the first three days of the week.

An attachment for $5,000 against the Electric Railway Construction Company, of New Jersey, in favor of Andrew W. Kent, was issued last week.

Russell & Company's agricultural and engine works, at Massilon, Ohio, employing 800 men, will close for an indefinite period about August 15, on account of the uncertainty of the business future.

The Pueblo, Colo., City Railway Company has passed into the hands of H. F. Chubuck as receiver. The company has operated five lines of electric railroad in Pueblo and the suburbs. The trouble has been precipitated by the action of the creditors of the Chamberlin Investment Company, of Denver, which lately failed, the Chamberlin Company having been a heavy stockholder in the railroad.

The Lehigh Valley Traction Company has decided not to build the proposed line from Bethlehem to Catasauqua, Pa., and as a result the conditional franchise granted the company to lays its tracks in Bethlehem is null and void.

Lightning and Strong Current Arresters as Used for the Telephone.

READ BEFORE THE SOCIETY OF ARTS, BOSTON, BY I. H. FARNHAM.

When Franklin proposed to erect lightning rods which would convey the lightning to the ground, and so protect buildings to which they were attached, superstitious people were not wanting who proffered all sorts of warnings. Some argued that it was "as impious to ward off heaven's lightnings as for a child to ward off the chastening rod of its father." Others went to the opposite extreme and concluded that if there was any impiety about lightning rods it lay in the fact that they invited the "chastening rod," and that it was madness to "tempt Providence" in any such way.

The foregoing is substantially one of the records given in connection with the first attempts to prevent the danger of the lightning's stroke, as long ago as 1752. From that time to this the sons of Franklin have been seeking the best means of diverting the discharge of nature's great "Leyden jar" away from people and property.

The necessity of protecting telegraphic instruments from lightning was forced upon the pioneers in this art, and considerable ingenuity was exercised in those early days upon the problem. It will be interesting before passing to the direct subject of this paper to glance at those earliest forms of protectors.

The first lightning disturbance on electrical instruments was noted on the telegraph line laid down at Göttingen in 1833 or 1834. Ten years, however, had passed when Professor Morse, encountering the same troubles with his first line, was compelled to seek a remedy.

Among some of his devices was that shown in Fig. 1. It consisted of a brass ball, surrounded by a metal ring, which ball was connected with the ground. The ring had on its inner surface a number of small points projecting towards the ball, but not in contact with it; it formed a part of the line circuit.

In 1846 the American Philosophical Society called the attention of Professor Henry to the subject. He made careful deductions from his study of the difficulty, and to him is credited the plan of running a wire from a ground plate up the telegraph pole, and ending it about a half inch directly beneath the telegraph wire, as shown in Fig. 2.

This method of protection is employed to-day on many lines, though it serves only to arrest the very heavy discharges, the space between the end of the ground wire and the line wire being too great to take away ordinary or, to the instruments, even dangerous discharges.

Steinheil, in 1846, used metal plates six inches in diameter, separated by thin silk cloth; these plates were placed on the roof of the station and protected from rain by a wooden box. This arrester proved quite satisfactory.

In 1847 a French electrician, Brequet, proposed using a very fine wire from the station to the main line, 15 or 18 feet distant. This was expected to fuse on the passage of lightning, thus arresting it before entering the station.

Those early workers in the electrical field had only nature's lightnings to guard against, while we meet to-day a much more difficult problem in guarding our delicate apparatus from many forms and degrees of strong currents, down to the happily named "sneak" current, which steals in over all the early forms of protectors and silently consumes the apparatus.

It is the combination of difficulties found in guarding against this wide range of troublesome currents, without at the same time rendering the instruments insensible to their legitimate currents, as well as to outline the results so far accomplished, particularly as applied in the telephone field, which interests us.

There are now about 350 different American patents on lightning and heavy current protectors. We will mention only a few characteristic forms. They may be divided into several different classes, each class embodying individual and distinct features. There are forms which open the line circuit, and so shut out the dangerous current; and others which offer to the heavy current a shunt or by path around the instrument to

be protected. Again, they can be divided into single-acting and multiple-acting—that is, devices which, after being operated, are automatically readjusted for further service—and those which require manual resetting.

I prefer, however, to arrange them in the following four classes:

1. Air space or spark arresters.
2. Fuses.
3. Magnetic devices.
4. Thermostatic devices.

Some protectors embody more than one

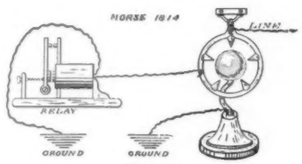


FIG. 1.

principle in their operation, and so cannot be strictly confined in any one of these classes.

The "air space" arresters, the first class, include Professor Morse's ball and pointed ring and Professor Henry's wire ending at a point near the line on a pole; also the plate arrester as modified by the silk cloth of Steinheil, and the paper separators of other inventors—a large variety of forms well adapted to divert lightning from the lines to the earth. One form, a two plate arrester in common use by telegraph companies, has brass line plates separated from a brass ground plate by a rubber ring about $\frac{1}{32}$ inch in thickness, allowing an air space between the line plate and the ground plate, through which the high potential charge of atmospheric electricity passes as a spark. [In the model shown several spots could be seen where the brass had been fused by the discharge.] In fact, it is the liability of the metal plates fusing together and thus intercepting the passage of the working currents that has induced many persons to try other means of protection. The insertion of varnished or paraffined paper between the plates sometimes, but not always, prevents this.

In several other forms paper is used between plates; an arrester having a heavy copper rod set into a groove in a wooden

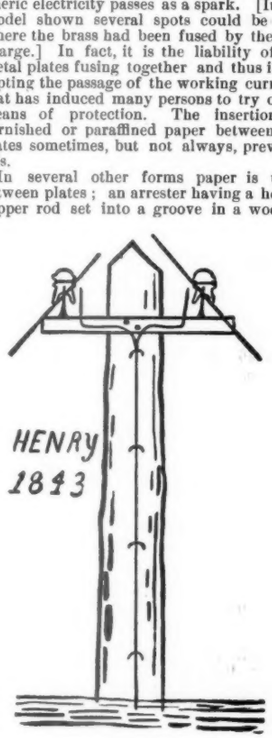


FIG. 2.

base, with strips or plates of brass held against the rod, separated only by thin paper, has proved a very efficient lightning arrester. I have sat during a thunderstorm in a wire tower having 400 lines passing through a set of these arresters, and was interested to hear the little discharges take place, now on one line and again on others, sometimes accompanied by the lightning flashes which evidently caused them.

In other forms, again, these arresters have points on one or both plates. Arresters provided with such points are supposed to be superior to those having plain surfaces, but in practice it is difficult to discover the advantage.

It should be remembered that air space arresters, in order to be effective, must have a very small space through which the discharge is to take place. Failure to recognize this fact has caused the loss of many instruments, and was the reason why Professor Morse's and Professor Henry's air space arresters were not as satisfactory as hoped. It is for this reason, too, that many of this class of arresters, having paper or cloth separating the disks or plates, have proved more satisfactory than the strictly air space form. In the latter, manufacturers and users have failed to place the plates or points near enough together, fearing actual contact.

The high potential current will spark across the air space more readily than through paper or other material; hence, other things being the same, the purely air space is the better, though, as has been stated, until very recently the paper separated plates have proved more reliable in practice, on account of the certainty of the very small separation of the line and ground plates.

The arrester shown in Fig. 3 combines the advantages of both the purely air space and the forms having paper separators. It was designed by a Mr. Bowers, of Fitchburg, Mass., who probably was the first to employ the use of perforated paper or other insulating material between the arrester plates. This arrester has done good service, as can be seen from an examination of a strip of plates which has been in practical use. It is interesting to note that the discharges have taken place in every instance through the openings in the paper, and not through the paper itself.

Let us now look at a modern air space arrester constructed on the principle of the one just examined, but possessing several advantages over it. The plates are of carbon, and therefore non-fusible. Having a

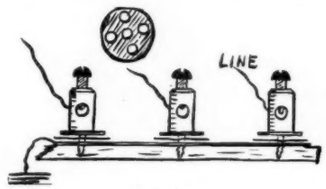


FIG. 3.

roughened surface they contain whatever advantages there are in point arresters. The plates are separated by a sheet of perforated mica. The mica is of such a thickness (about .0035 inch) as to allow a discharge to take place across the space when the difference of potential between the plates reaches or exceeds 300 volts. This arrester has been constructed in several forms. It was found in service that occasionally particles of carbon dust were dislodged from the plates at the air space, thus connecting them together. The arresters are now so constructed that the plates may be readily withdrawn from the clips which hold them in position.

The "fuse," our second class, was suggested first by Brequet, in 1847, as a lightning arrester. A fuse has little value as a protector from lightning, the discharge being so sudden and disruptive that by the time the fuse has operated the enemy has struck the fatal blow and vanished.

Fig. 4 shows an arrangement of fuse and lever designed to open the main line from the instrument and connect it to the ground in season to save the instrument and dispose of the lightning discharge. Numerous arresters have been devised on this principle. Such apparatus is "too slow" for lightning.

Fuses, however, have found their value in protecting against continued currents—such as are diverted from electric light and power wires.

Of fuses in common use, the "Vail," consisting of a very narrow bit of tinfoil protected in a hard rubber tube and mounted to be easily replaced by a fresh tube and foil, was one of the early forms employed by the telephone companies. It was intended to operate with about one-half ampere of current. This protector was very useful in cutting off heavy currents, but was found wanting in two essentials. First, it would often allow a current just strong enough to destroy an annunciator on the switchboard to pass it, while very small atmospheric discharges, too feeble to cause any trouble whatever to the apparatus, would open the fuses by the score.

The "Hibbard" protector—a foil wound up in asbestos paper and held between German silver clips, has also been much used, and has saved many offices from damage and possible fire, but is found to have the same objections as presented in the "Vail." German silver wire of very small diameter has been used to a limited extent, sometimes being stretched through glass tubes.

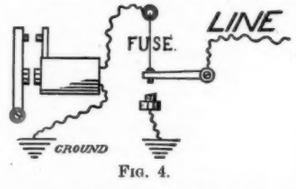


FIG. 4.

A form of protector embodying both the fuse and plate arrester has been used. It consists of a fine copper or German silver wire wound about a metal rod; the wire forms a portion of the line circuit, and is separated from the rod by paper or other thin insulating material, the rod, of course, being connected with the ground.

The third class comprises a large variety of "magnetic devices." Some are designed to open the line, while others shunt the instrument to be protected through a heavier wire, usually that around the protector magnet itself. The use of the magnet has been an inviting field for protector inventors, as by its use, and scarcely by any other means, has it been deemed practicable to construct an automatically restoring pro-

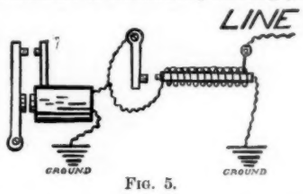


FIG. 5.

tector for continuous heavy currents. Fig. 5 fairly illustrates one of these arresters, designed to shunt the instrument through the comparatively coarse wire around the protector magnet. It will be understood from the illustration that the ordinary working current will not operate the armature of the protector. A heavy current, however, will bring the protector armature against the contact point placed on the magnet core, and form a shunt around the telephone or other instrument to be guarded. This instrument is sometimes modified by being provided with two or more distinct coils of wire, each one differing in sensitiveness from the others, the object being to cause the armature located in front of the coil, having many turns (necessarily small wire), to operate with moderately strong currents, while armature of the coarser coil and less number of turns responds to currents that would endanger the smaller wire. Fig. 6 is intended to show a form of this instrument. The "Cartwright" protector [presented] is constructed on this principle.

When arc light circuits were the only ones liable to come in contact with wires conveying feeble currents the form of protector just described was quite satisfactory; in fact, it was extensively adopted for

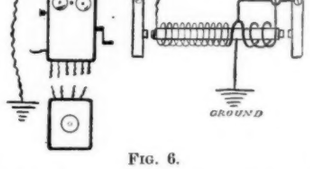


FIG. 6.

electric fire alarm systems. It is readily understood that this protector is self-restoring or multiple-acting, because the moment the abnormal current ceases the protector armature returns to its usual position. Arc light dynamos automatically adjust themselves to deliver a current limited to nine or ten amperes, and this would not endanger ordinary office and line wires, or even the wire used in the form of protectors just described; but this is not true of railway and other power dynamos, which may yield a volume of current sufficient, if allowed to continue, to destroy any wire employed either in the protectors themselves or the connecting lines. For this reason, wherever this form of protector is used to-day it becomes necessary to add a fuse wire in the circuit to protect the protector itself against very heavy currents.

A magnetic device for opening the circuit is shown in Fig. 7. There are a number of similar forms. This is called the "Plush," from its inventor, Dr. Plush, of Philadelphia. It is extensively used by telegraph and, to a limited extent, by telephone companies. As a protector from dangerous currents, which continue upon the line until they are interrupted, it works admirably. Its weakness lies in the fact that, when it is so adjusted as to operate with moderately dangerous continuous currents, it is operated by discharges of lightning so small as to cause no danger; and, as it is not multiple acting, but leaves the line open until manually reset, it frequently occasions delay. Located on grounded lines in central offices, where attendants are always at hand, it is a good protector.

Fig. 8 illustrates the operating principle of an ingenious protector brought out by Mr. Clauson, of Boston. It might be termed a compromise between the last two forms described. To a great extent it has the advantage of both, without the faults of either. The magnet is surrounded in this case by an ordinary coil of copper wire supplemented by another coil of very high resistance. The armature, when standing in its normal position, shunts the high resistance coil from the line circuit. When, however, a heavy current passes through the low resistance coil the armature is moved forward, thus bringing instantly into the circuit the high resistance coil, which by its resistance reduces the dangerous current to an amount safely carried even by its own fine wire. There is at the same time sufficient foreign current allowed to flow to retain the armature in the "safety" or protecting position. When the source of the dangerous current is removed the armature automatically returns to its back stop again, shunting the now unnecessary resistance from the line. Mr. Clauson has constructed several modifications of this protector, in one of which he employs carbon resistance.

(*Concluded next week.*)

Electric Power on the Erie Canal.

As several inquiries have been made relating to the proposed use of electric power on the Erie Canal in this State, we publish below the full text of the bill. This is entitled, "An act concerning the canals and experimental work thereon," and was approved by the Governor of New York, April 29, 1893:

SECTION 1. The superintendent of public works is hereby authorized and empowered

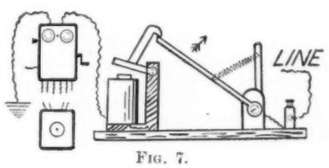


FIG. 7.

to designate or set aside such portions of the Erie Canal as, in his opinion, it may be expedient so to do, for the purpose of conducting experiments for testing the efficiency, economy and practicability of such devices as may be offered for improving, by electrical or other means, the present system of canal towage, and the superintendent of public works is hereby authorized and empowered to adopt such rules and regulations governing the conduct of such experiments as may in his opinion be required to prevent the same from unnecessarily interfering with the present traffic of said canal, or from doing any damage to said canal or any of its appurtenances. Subject to the operation of these rules and regulations, and under the control and direction of the said superintendent of public works, any citizen of this State or corporation authorized to transact business within its limits, who may present to the said superintendent of public works any device for improving said method of towage which may commend itself to his judgment, may erect at his or their own cost and expense, on such portions of said canal as may be designated for the purpose, and on lands owned by the State, such temporary buildings or other structures, with necessary machinery, and raise and temporarily maintain such poles along the line of said canal, and string wires thereon, as may be necessary for testing the efficiency, economy and practicability of such device.

SEC. 2. The superintendent of public works may, from time to time, authorize any person or corporation to construct, maintain and operate electric conductors for light, heat or power, upon or along any canals of the State or any portion thereof, upon such terms and conditions not inconsistent with the public use of such canals as he may impose; and in like manner he may

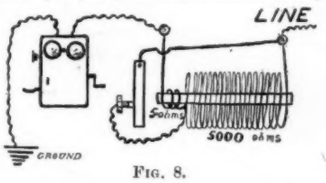


FIG. 8.

contract for or permit the use of such light, heat or power upon any such canal; provided that he shall thereby create no charge against the State, except as against appropriations lawfully applicable to such purpose.

SEC. 3. This act shall take effect immediately.

An Electrolytic Copper Refinery.

An immense electrolytic copper refinery has been started at Great Falls, Mont., by a Boston company. It comprises 288 depositing vats capable of containing at one time 1,600,000 pounds of pig copper anodes, and has a capacity of 1,200,000 pounds of pure electrolytic copper per month. The plant is run by water power, situated at a distance of 2,100 feet from the works. The current is supplied by two dynamos, of 165 kilowatts capacity each. The total cost of the plant, exclusive of real estate, is said to have been over $350,000. The metal refined contains a large percentage of silver, all of which will be saved by the electrolytic process.

DOTS AND DASHES.

The contract has been signed for lighting Havre de Grace, Md., with electricity.

The city fathers of Quitman, Ga., are figuring on the question of water works and electric lights.

A company is being organized at Douglas, Colo., to put in a water power plant for lighting the city and for raising water for irrigation.

Prospects are bright for Bay City, Mich., securing another industry. Romaine Callender, of Brantford, Ont., has written to the Business Men's Association that he will be in the city soon to talk over the establishment of a factory here to manufacture his automatic telephone, which is designed to take the place of telephone girls.

Last week, just before the electric light plant at Wadena, Minn., shut down, the governor of the engine broke, and before it could be shut down the engine attained a very high rate of speed. The armature in the dynamo was unable to stand the strain, and as a result the machine was very badly damaged. Pieces were hurled in every direction, but luckily no one was struck.

Forbes & Wallace, of Springfield, Mass., have decided to light their stores by electricity, and last week they closed a contract with the local agent of the General Electric Company to furnish the plant. Two dynamos of 1,350 lights capacity will be put in, and the stores, including the new building, will be wired for 680 incandescent lights and 98 arc lights. The cash carrier system will also be run by electricity.

The incandescent light service of Berkeley, Cal., has been furnished by power generated at the light plant of the city; but now a change will be made, and the lights and circuit will be made wholly independent of those belonging to the city. It will take two days to effect this, and during that time the service will be interrupted. Prices will be reduced, in the expectation of a much more general use of incandescent lights in private houses.

There is war between the Western Union and Postal Telegraph companies in Newark, N. J. A wire which the Postal had stretched to the finishing point of the Middle States regatta last Saturday was cut, and the Western Union people, who had a competing line run to the same point, are blamed. The manager of the Postal Company, James A. McClary, vows that he will cut down every wire belonging to the Western Union from the Postal poles.

The high wind in various sections of the country has done considerable damage to the telegraph wires, but not of a nature sufficiently serious to interfere much or for a long time with communication by wire. The superintendent of the Western Union Company reported that in the South the damage was much scattered. Between Philadelphia and New York everything is all right, but between Philadelphia and Baltimore three-fourths of the plant was rendered useless.

The electrical fountain will be ready to play on the Lynn, Mass., Common, September 15. This fountain is the gift by the will of William Shute, and will cost $2,000. The fountain is to have six tiers of water spray, the first to be a water fall. The final jet will send a spray forty feet into the air. The different colored electric lights will make a most beautiful display. A suitable memorial tablet will be placed in the fountain, with appropriate words for the giver. It will cost $150 a year to run it.

An electric fountain will be donated to Schenley Park, in Pittsburgh, Pa., by the Fifth avenue and Duquesne traction companies. The order for its construction was given some time ago, but it will not be completed for a month. When delivered it will take but a few days to place it in position, so that in all probability it will be in operation by September 1.

The plans for the arrangement are very elaborate, and the total cost will reach $20,000. The makers promise that it will be the finest of its kind in the world, surpassing even the remarkable fountain in Lincoln Park, Chicago, one of the wonders of that city. Mr. Bigelow intends going to Chicago on Monday especially to see the fountain there and examine into its operation. It has been built some three years, and the chief thinks there might be room for improvement in building one with more recent appliances.

Much has been said about electricity as a factor for destructiveness in the various gyrating storm clouds known as cyclones, drechoes and tornadoes. In all of this voluminous mass of so-called scientific opinions and deductions one facts seems to have been entirely overlooked—viz., the almost resistless force of wind when moving with high velocity. When the velocity is but fifty miles an hour the pressure of air in motion is equal to twelve pounds to the square foot, and when this velocity rises to 100 miles per hour its force rises to the equivalent of 49.2 pounds to the square foot, the augmentation of force being always proportional to the square of the velocity.

It needs no further elaboration or amplification of this statement to convey to the intelligent reader an idea of the monstrous mechanical force which such a rapid traveling mass of air must have—a power great enough to tear down any structure that has yet been built by man, or to uproot whole forests of the largest trees now growing on the surface of the earth. The intention, however, is not to use electricity as a remedy, but as a preventive.

OBITUARY.

DEATH OF JOHN STEPHENSON.

John Stephenson, the veteran car builder, died at his home on the Boston Post Road, New Rochelle, on July 31. Death was due to a severe attack of pneumonia and grip, which Mr. Stephenson had about three years ago. Since that time his health had been impaired. Up to within a few days of his death, however, Mr. Stephenson attended to the duties of the company, of which he was the president, when he was obliged to take to his bed. Mr. Stephenson was born in Armagh, Ireland, of English and Scotch parentage, on July 4, 1809. In 1811 he came to New York with his parents, and he made New York his home for life. His father intended that young Stephenson should pursue a mercantile business, and had him educated at Wesleyan Seminary.

After spending several years in a counting house he was apprenticed to a coachmaker at the age of 17. In 1831, after his apprenticeship had been completed, Stephenson was induced to open a shop of his own by Abram Brower, who then owned the Broadway line of omnibuses. In March, 1832, the building and entire stock were destroyed by fire. The first car built by Mr. Stephenson was made for the New York and Harlem Railroad, and was styled John Mason, after the president of the road.

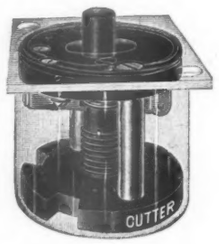
The name of John Stephenson soon spread, and in a short time cities for miles around ordered cars from him. In 1843 Mr. Stephenson was compelled to enlarge his works until the present factory was built in Twenty-seventh street, near Fourth avenue. Mr. Stephenson would never accept any political office, or, in fact, any office beyond that of school trustee of the Twenty-first ward. This office he held for nearly a quarter of a century. Mr. Stephenson's wife died about 12 years ago, and a daughter, Mrs. D. U. Pugh, and two sons, J. B. and S. A. Stephenson, survive him.

Capt. John Brown McMath, the oldest pilot in point of service in the Revenue Marine, and pilot of the cutter "Washington," died in South Brooklyn on August 2. Capt. McMath was aboard the "Niagara" when she helped to lay the first Atlantic cable.

Cutter's Economic Door Switch.

Economy in the use of current for lighting purposes hinges largely on the devices for readily turning it off or on just as it is needed. In most cases some lights are used much more than necessary, while other points are not fitted up at all, owing to the risk of increased consumption of current. This is particularly the case with closets, store rooms and the like, where the light is needed very rarely and the hired help is apt to leave it turned on all day long.

A simple device, which would obviate this, can, evidently, save current and make the lighting of odd corners inexpensive, and this, it is claimed, is done by the "Economic" door switch, devised by George Cutter, of Chicago. This new switch is set



flush in the rabbit of the door jamb so that the door itself presses against the projecting button. On opening the door the light is turned on and burns until the door is closed, when the switch shuts it off. Then there is no need of hunting for the switch in the dark, or of remembering to turn it when leaving, neither can any current go to waste when the door is closed. The saving in current and in the life of the lamps is worth considerable, to say nothing of the great convenience of such devices.

Crude contrivances have been used for the same purpose, but have resulted in numerous fires and general dissatisfaction, while this, as a well built switch, cannot fail to give good service. As the cut shows, it has a cylindrical casing, so that a hole bored into the door jamb is the only fitting required. The switch itself has a positive spring action and has hard rubber insulation throughout. Such a device will readily adapt itself to a large variety of uses; hence, George Cutter has reason to expect a large trade for it both east and west.

A Hypnotic Phenomenon.

Last week a boy was run down by a trolley car in Brooklyn; the conditions, to say the least, are peculiar. He was standing on the track apparently in full possession of his senses, watching the trolley car bearing down upon him. The warning gong was struck several times, but to the astonishment of the motorneer the boy remained as if rooted to the track, and it became impossible to stop the car in the remaining short distance. Explanations poured in, as a matter of course, thick and fast. The prevalent one was that the boy was too frightened to move. No definite result, however, can ever be reached, as the only person who ever knew anything about it is dead. We can only surmise, but it is very probably due to at least two causes.

Any one who has ever been frightened by a sudden noise immediately after a prolonged silence, will realize what effect the clash of the unmusical trolley or cable car bell has on nerves which are not on a tension; then, again, if one will notice the next time he stands upon a track and watches an engine bearing down upon him, the peculiar sensation produced by the apparently supernatural growth of the engine as it approaches, he cannot fail to realize the possibility of a combination of these two influences. The word spellbound expresses the feeling, and it is not to be wondered at that, owing to the many similar experiments performed by Charcot, a hypnotic influence was produced which resulted in the loss of control of the muscles of the boy's body. How simply all this could have been avoided by the employment of a satisfactory and practical fender.

ELECTRIC RAILWAY AND POWER NOTES.

The subject of an electric road from Bath to Hornellsville, N. Y., by way of Howard, is being agitated.

The work of constructing the electric road between Haverhill, Mass., and Lawrence is being rapidly pushed.

A petition is in the hands of the selectmen of Tewksbury, Mass., from the Lowell and Suburban Street Railway Company, asking the permission of the town to lay an electric car line through Tewksbury Centre and North Tewksbury back to Lowell through Belvidere. The great majority of the people of Tewksbury are said to be thoroughly in favor of granting a franchise, and a hearing will begin at an early date.

The New Haven, Conn., town and city committee on railways last week awarded to the General Electric Company, of Boston, a contract for furnishing electrical apparatus for moving the Tomlinson drawbridge over the Quinnipiac river. This much used draw has been run by a small engine, which will be replaced by electricity, the apparatus being placed under the bridge. It will be the first draw operated by electricity in the State.

The State Railroad Commission, of New York, gave a hearing last week on the applications to change their motive power from horses to electricity of six local railroad companies in Brooklyn, N. Y., viz.: The Broadway Ferry and Metropolitan Avenue, the Broadway Railroad Company, the Kings County Electric Railroad Company, the Nassau Electric Railroad Company, the Brooklyn City Railroad Company, and the Coney Island, Fort Hamilton and Brooklyn Railroad Company.

Henceforth the Lowell & Suburban Street Railway Company will do all its own lighting at Lakeview, Mass., and in all its buildings. Last week the steam was turned on the new engine which had been put it for this purpose. This engine is a compound tandem Corliss, and runs a new generator of 150 horse power. This generator will not only furnish the current for the lights but will supply the power for the cars, instead of the large generators late at night, when the rush of the day is over. The road is soon to try a new life saver, and will have a car equipped with one in about three weeks. It has never been tried anywhere, but much is expected of it.

The operation of a large factory plant with electricity transmitted a distance by wire is to be attempted at Columbia, S. C. The current will be generated with turbine wheels at the canal and thence transmitted to motors in the factory building, the foundation of which is considerably above the canal. The distance over which the current will be carried is not great, but the enterprise is the largest to which the application of electricity has yet been attempted. The plant is a cotton spinning and weaving mill, which, when completed, will be one of the largest in the State. The experiment will be an interesting one, especially from an engineering point of view.

A terrible explosion took place at Waco, Tex., last week. The large power house of the Waco Gas and Electric Lighting Company is in ruins, and the power house of the Citizens' Electric Railway adjoining is badly damaged. Two men were frightfully injured, and their recovery is doubtful. Both power houses are situated on the bank of the Brazos and removed some distance from the other buildings. The machinery in the electric light company's building was in operation when, without warning, a terrific explosion took place. One of the four large boilers exploded and literally demolished the building. The end wall furthest removed was all that was left standing. Immense masses of brick, timber and machinery were blown in all directions. The power house of the Street Railway Company, adjoining, was badly wrecked.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

New Electric Railways.

CARLISLE, PA.—O. H. Ormsley, of Altoona, Pa., and Dr. S. R. Ickis, of Pittsburgh, Pa., have petitioned for a franchise to build an electric street railway here.

GETTYSBURG, PA.—Work on the Gettysburg trolley road has been suspended, the contractors, Duerr & Co., of Philadelphia, having abandoned their contract.

OAKLAND, CAL.—F. M. Smith is reported to have secured a controlling interest in the principal street railways here, and it is stated that he will construct an electric railway to San Jose.

HUNTINGTON, O.—W. H. Thompson, of Lima, O., principal stockholder and general manager of the Lima Street Railway, contemplates constructing an electric railway in Huntington.

LOCKPORT, N. Y.—The Lock City Electric Railway Company has begun work on the construction of its electric railway.

MERIDIAN, MISS.—The Meridian Street Railway Company is conferring with Edison agents relative to using an electric system.

WASHINGTON, D. C.—A syndicate, headed by Stillson Hutchins and Jacob P. Clark, has purchased a controlling interest in the proposed Washington and Great Falls electric road, and will begin its construction in a few weeks.

DES MOINES, IA.—By articles of incorporation filed, the Des Moines Street Railway Company and the Des Moines Suburban Railway Company become one institution, a consolidation having been effected. The new company is the Des Moines City Railway Company; capital, $3,000,000. The officers are J. S. Polk, president; G. M. Hippee, vice-president; E. M. Hunter, treasurer; G. H. Huttontocker, secretary, and G. B. Hippee, general manager.

PATERSON, N. J.—A syndicate of New York, New Jersey and Philadelphia capitalists is preparing to build an electric railway between Paterson and New Brunswick. The proposed line will be about 40 miles long, and if the storage battery is sufficiently developed to be practicable, it may be utilized. The officers of the company are Jacob L. Stadelman, president and general manager, Bath, Pa.; John N. Bethel, secretary, Philadelphia; Chas. E. W. Smith, treasurer, Norristown.

ST. LOUIS, MO.—The St. Louis and Kirkwood Electric Railway Company, capital $100,000, has applied for articles of incorporation. The directors are Dr. John Pittman, Geo. D. Edwards and George W. Taussig, of Kirkwood; Jeremiah Fruin, of St. Louis, and J. D. Housman, of Windsor Springs.

MT. CLEMENS, MICH.—A franchise for an electric street railway between Mt. Clemens and Detroit, has been secured by Reilly, Hurbnor & Erskine, but whether the road will ever be built under the existing terms is a question much discussed. The council has imposed on the company conditions that cannot be found in cities of 50,000 inhabitants.

BALTIMORE, MD.—The City Passenger Railway Company will build car shops and will manufacture its own cars.

SPRINGFIELD, MASS.—The directors of the street railway company have voted to furnish their own power for the electric cars, and will at once prepare plans and specifications for the power house, and let the contract for the building and engines.

MT. VERNON, N. Y.—The aldermen have refused the application of the Union Electric Railway Company for an extension of time in which to complete its road.

SANDUSKY, OHIO.—Work has been stopped on the Sandusky, Milan and Norwalk electric road, on account of the inability of the directors to raise funds.

Electric Light and Power.

MIDDLETOWN, CONN.—The Schuyler Electric Company has completed what is said to be the largest electric search light in the world. The lens and mirror back of the light are each five feet in diameter, and the light is of 375,000,000 candle power.

LUZERNE, PA.—The West Side Electric Light Company has been incorporated with a capital of $10,000.

BELAIR, MD.—Joseph M. Zamoiski, of Baltimore, has made a proposition to erect an electric light plant in Belair.

ROCHESTER, N. Y.—The Central Light and Power Company, capital stock $25,000, has been incorporated to manufacture and sell electricity for producing light, heat and power in this city. The directors are J. W. DeWitt Butts, E. V. Stoddard, Joseph C. Tone, F. S. Macomber and George Wilson.

FLATBUSH, L. I., N. Y.—The Knickerbocker Electric Light and Power Company has been granted a franchise by the Town Board.

REYNOLDTON, PA.—George Altmeyer has been granted a franchise to erect poles and string wires for electric lighting purposes.

ST. LOUIS, MO.—The Municipal Electric Lighting and Power Company and the Missouri Electric Lighting and Power Company has consolidated. An effort will be made to get rid of the city lighting contract which has proved so unprofitable to the Municipal Company.

MARENGO, ILL.—This town will vote on the question of issuing bonds for the establishment of an electric light system.

HINGHAM, MASS.—A committee has been appointed to proceed with the establishment of a municipal electric light plant.

TRENTON, ILL.—The city will consider proposals for putting in a system of electric lights. A free franchise will be given.

ST. LOUIS, MO.—The Edison Illuminating Company filed an increase of capital from $3,500,000 to $4,000,000, with assets of $1,069,593.70, and liabilities, $917,000.

New Telephone Companies.

RIO VISTA, CAL.—The Rio Vista Telephone and Telegraph Company; capital, $30,000. Incorporators, J. M. Sullivan, of Denverton; C. E. Garfield, D. G. Holt and J. E. Sullivan, of Rio Vista. The line will run from Suisun through Denverton to Rio Vista and Bird's Landing, a total distance of about 36 miles.

MACON, GA.—A telephone line will probably be constructed from Macon to Knoxville, Tenn. Bolivar H. Ray is interested.

New Manufacturing Company.

NEW LONDON, CONN.—The Holt Electric Indicator Company; capital, $15,000. Incorporators, E. Munger, Wm. A. Holt, Charles F. Holt, George B. Prest, W. S. Star and C. G. Beckwith. The company will manufacture electrical appliances and instruments.

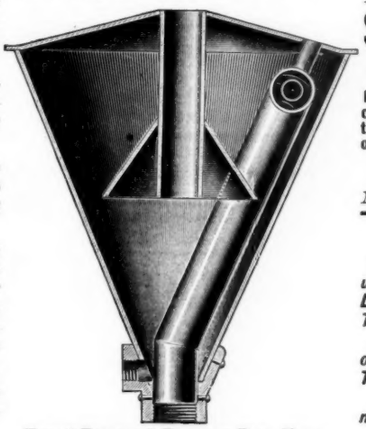
The Eclipse Exhaust Pipe Head.

The New York Exhaust and Blow-Pipe Company, 136 Liberty street, New York, have just placed upon the market the "Eclipse" exhaust pipe head, upon which they have recently been granted letters patent. They are meeting with great success and a large sale is expected for them.

As will be seen from the accompanying illustration, the exhaust steam as it passes into the head is carried near the top, then discharged horizontally around the head, giving it a centrifugal motion, and driving all the solid matter to the outer wall, there to run down the side, and out the drip, and allowing the light and dry steam to escape through the center of the top. In addition to the above centrifugal motion, there is a small pipe running from the top outside, and so connected, that when the exhaust steam is passing through the larger pipe it causes a suction in the smaller one, thereby drawing cold air into the head, which, combined with the centrifugal motion, makes a very efficient system of condensing steam.

The Great Ferris Wheel at the World's Fair.

What a marvelous structure is the Ferris wheel, and what an opportunity it offers for a most dazzling and effective display of illumination by the electric light! Just think for a moment what a beautiful spectacle could be obtained by the judicious and harmonious grouping of from 3,500 to 5,000 incandescent lamps. This huge piece of work, an example of what human ingenuity can accomplish in an exceedingly short space of time, towers above the surrounding country to the height of 264 feet, the wheel itself being 250 feet in diameter. It is



THE "ECLIPSE" EXHAUST PIPE HEAD.

driven by huge sprocket wheels, around which travels a great sprocket chain which in turn plays in cogs constructed upon the periphery of the wheel.

The entire weight of the material used in its construction is estimated at 80,000,000 pounds of iron and steel, while upon the largest piece of steel ever forged, the great axle, 33 inches in diameter and 45 feet long, weighing 112,000 pounds, does the wheel itself, weighing 4,000,000 pounds, slowly revolve.

Paris had her Eiffel Tower, which remains to tell of the grandeur of her latest exhibition, but the Ferris Wheel, the monument at the World's Fair, is destined to play, in the near future, a part more in accord with cosmopolitan American ideas. Very likely it will be moved to turn for the Coney Island multitude, at 25 cents a turn.

Let us take a trip in it while it is at the World's Fair and view from on high the surrounding grandeurs.

The wheel turns from east to west, and we enter, when it has stopped, one of the 36 cars. As the wheel slowly ascends the vastness of the city bursts upon us, and as far as the eye can reach the ground seems dotted with structures of all kinds.

It is difficult to realize, when we have reached the top, that we are only 250 feet from mother earth; it seems as if the horizon is at an enormous distance. The wheel descends and we turn our faces towards the east and see the White City spread out in all of its magnificence.

Uniformed guards are stationed in each car to prevent any undue excitement which may arise from the nervous occupants being at such a height.

Another turn is made and we make our exit, admiring the man who had the courage to design and complete this grand structure, the first of its kind. J. A. M.

KINDRED INTERESTS

Otis Brothers & Company, 38 Park Row, New York, are enjoying a very large electric elevator business, in spite of the financial depression.

The Providence and Stonington Steamship Company's handsome ships are carrying a very large percentage of the traffic between New York and the East. There is no pleasanter way to travel than the "inside route" of Long Island Sound.

The Electrical Specialty Company, Denver, Colo., have issued the following circular:

We beg to advise you that we have bought out the entire stock of merchandise, manufacturing plant, accounts and good-will of the business of the Columbian Electrical Works Company, of this city, and intend carrying on a general electrical manufacturing, supply and specialty business. We have removed to premises, Sheridan Building, 1,629 Seventeenth street, hitherto occupied by the Columbian Electrical Works Company, and will be glad to meet there all who require electrical supplies or work done in that line. We take pleasure in stating that Mr. Harry W. Lawrence, late manager of the Columbian Electrical Works Company, is associated with us, and has charge of the manufacturing department, and will be glad to meet all his friends at the old premises.

SECOND-HAND RAILS.

We own and offer for sale cheap about 150 tons of second-hand Steel Rails, all carefully selected for relaying, and practically as good as new. Write or wire at our expense.

ROBINSON & ORR,
No. 419 Wood St., Pittsburgh, Pa.

ELECTRIC LIGHT.

The Municipal Council invite tenders up to the 30th of December next for Lighting the City of Launceston, Tasmania, by Electricity.

Plans, etc., can be seen at the office of the Agent General for Tasmania, 5 Victoria St., London, S.W.

The lowest or any Tender not necessarily accepted.

C. W. ROCHER,
TOWN CLERK.
Town Clerk's Office,
Launceston, 20th May, 1893.

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CANDELABRA
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INCANDESCENT LAMPS.

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Creosoted Lumber, Underground Conduits. Telegraph Poles, Piling and Ties Furnished.

THE PARTZ ACID GRAVITY BATTERY

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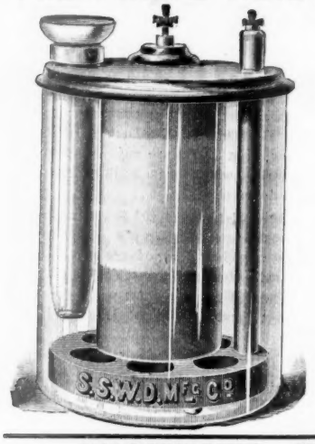

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CATALOGUE "T,"

Containing full particulars regarding our various new specialties in ELECTRICAL MEASURING APPARAUS, has just come from the printer. No such illustrated price list has ever been issued before, and a copy should be in the hands of every one having occasion to employ high grade apparatus.

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World's Columbian Exposition, August 3, 1893.

FORT WAYNE ELECTRIC CO.,
Fort Wayne, Ind.

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I herewith hand you Memorandum of Conference on lamp tests. We are now busy getting everything in readiness. I am confident that the rigorous tests that will be imposed on our machinery will in no wise impair the good reputation that it now enjoys.

Very truly yours,

(Signed) E. A. BARNES.

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COLUMBUS, OHIO, 57 EAST STATE ST.
SAN FRANCISCO, 35 NEW MONTGOMERY ST.